THE JOURNAL OF GAS LIGHTING
WATER SUPPLY & SANITARY IMPROVEMENT

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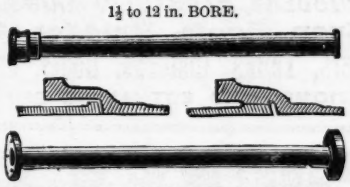

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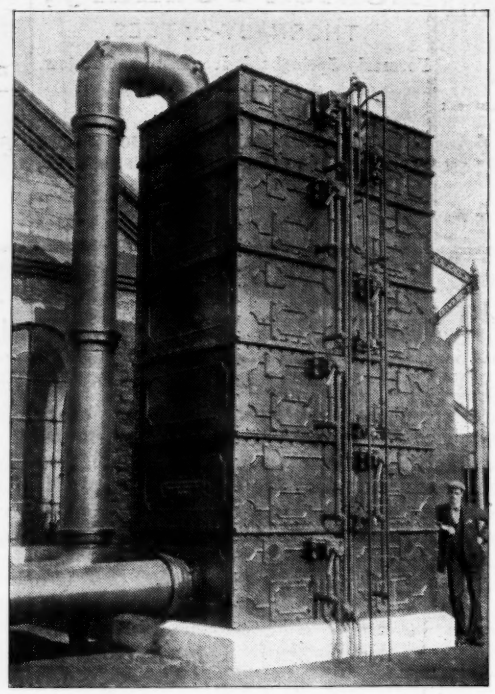

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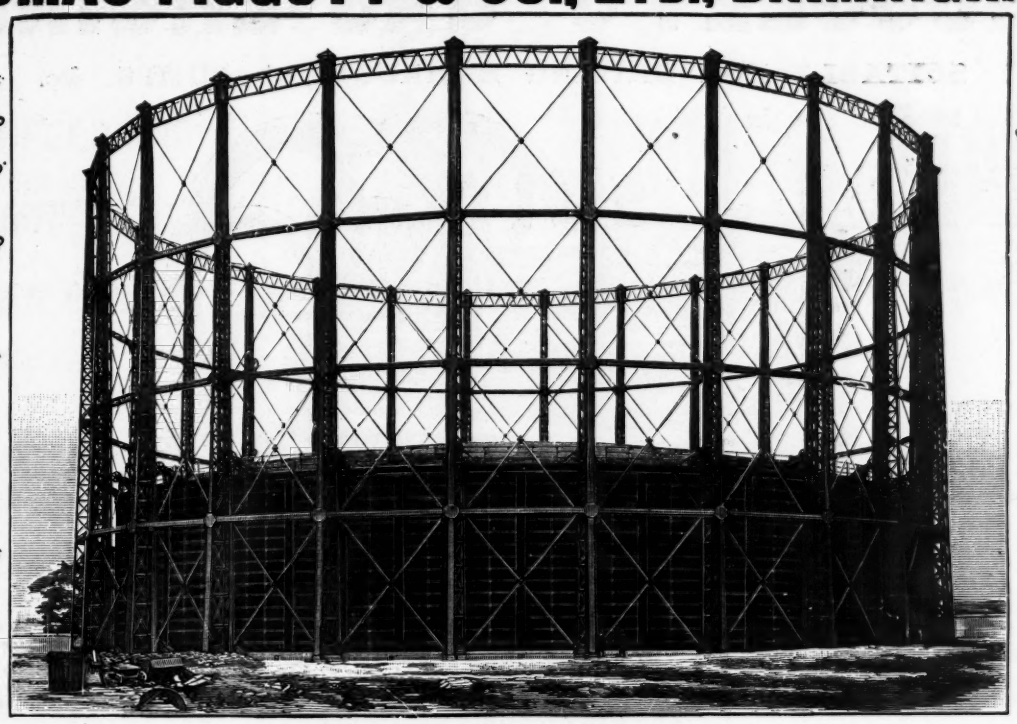

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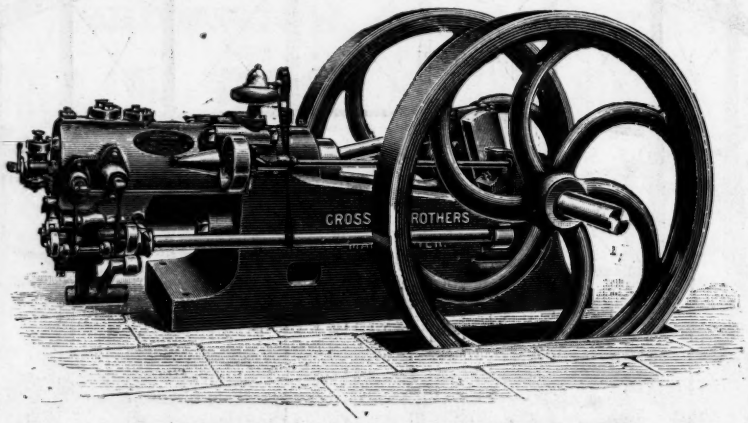

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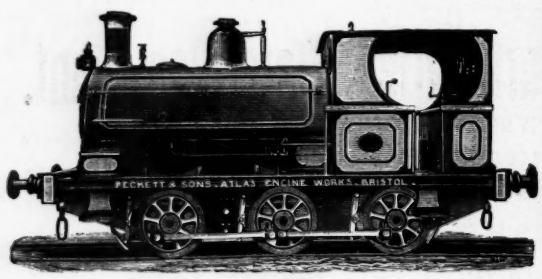

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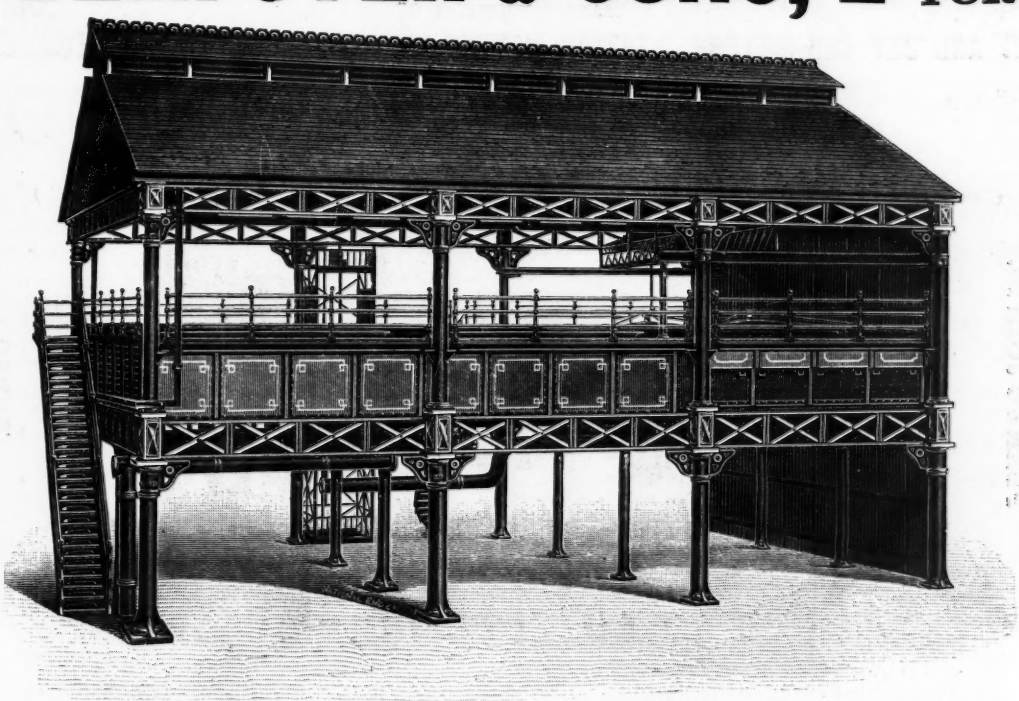

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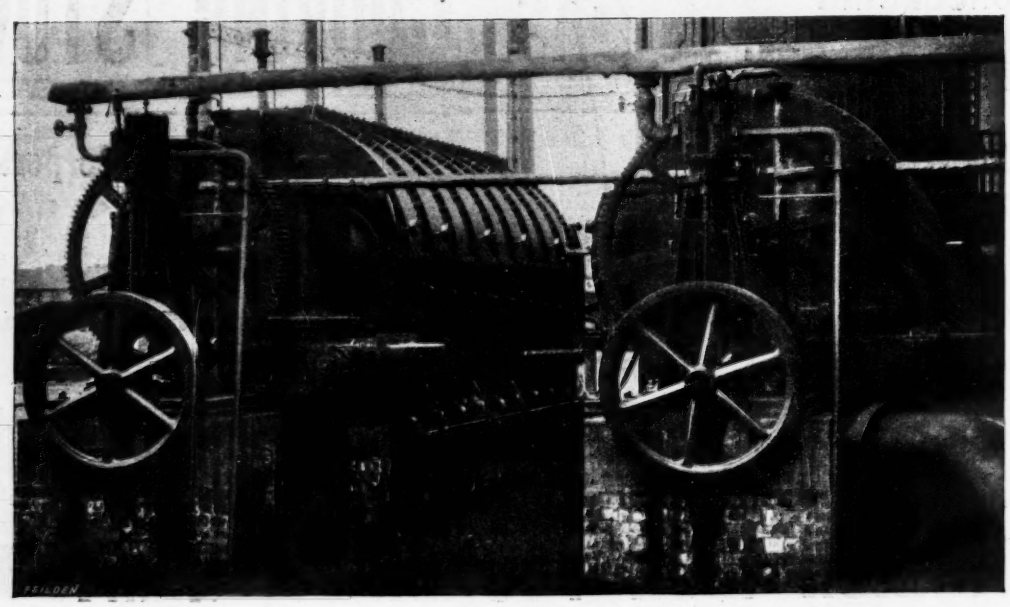

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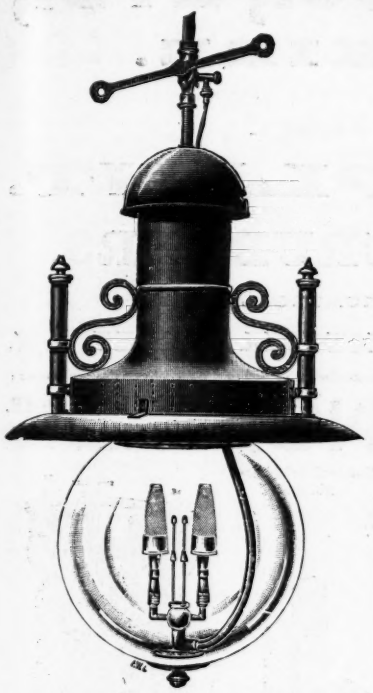

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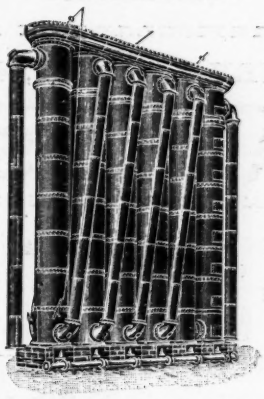

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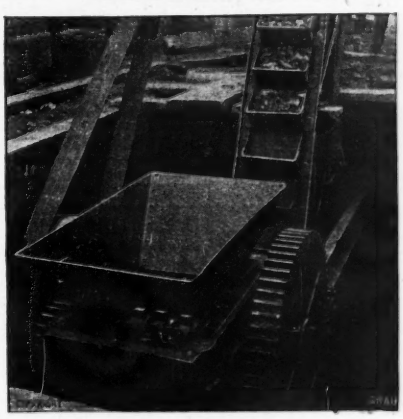

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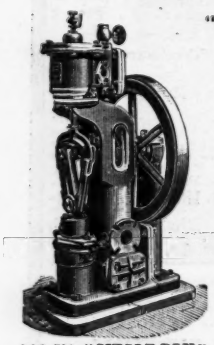

Fig. 705. "SINGLE RAM" STEAM-PUMP.

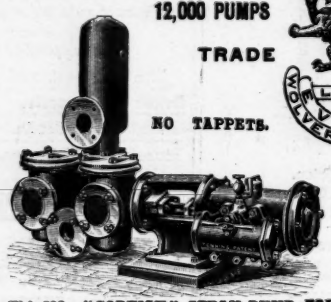

Fig. 598. "CORNISH" STEAM-PUMP FOR BOILER FEEDING, &c.

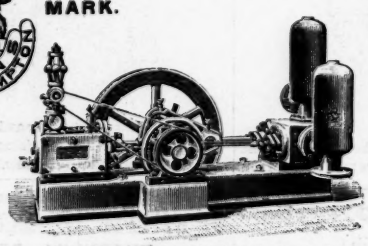

Fig. 685. "RELIABLE" STEAM-PUMP FOR TAR AND THICK FLUIDS.

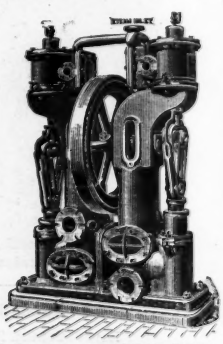

Fig. 713. "DOUBLE-RAM" STEAM-PUMP.

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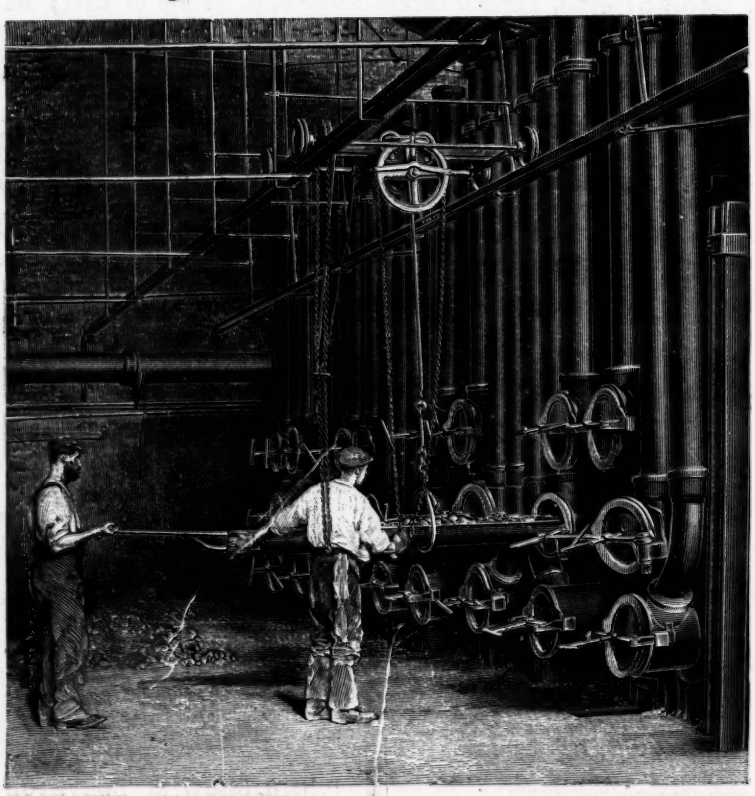

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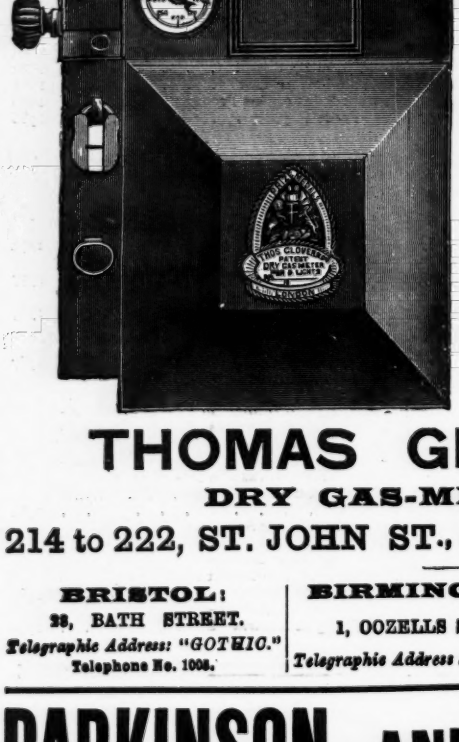

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JOURNAL OF GAS LIGHTING, WATER SUPPLY, &c.

VOL. LXXVII., No. 1987.——TUESDAY, JUNE 11, 1901.

EDITORIAL NOTES.

Strike and Destruction of a Gasholder at Cork.

In another column will be found a summarized statement of so much of the apparent truth of the latest sensational development of the strike at the Cork Gas-Works as it is possible to ascertain before the official inquiry is held. We have waited for the conclusion of the police court proceedings taken against the men who struck work, before discussing the merits of the affair. This part of the deplorable business is still in abeyance at the moment of writing; and therefore criticism must be further postponed. Gas managers who have read the account of the origin of the trouble, however, will have formed their own opinion as to the source of the outbreak. It appears that the labour difficulty was being overcome in the usual way. Fresh hands were engaged in sufficient numbers to take the places of those who had thrown up their job, or had been dismissed; and it is to be supposed that the sight of gasholders once more full could not have been of a reassuring character for the revolted gas workers. The works are, of course, under police protection; but it is to be feared that a poor watch was kept, for about the men's dinner-time on Monday last week something happened to the largest gasholder in use on that day. As usual, conflicting, absurd, and obviously unreliable newspaper reports of the occurrence forthwith appeared. The ordinary news reporter seems to be the most fallible of beings on all matters relating to a strike; and his ignorance, or carelessness, in telling what happens when anything goes wrong in a gas-works, is the despair of those who would fain have the plain tale plainly told.

We gather from various newspaper accounts, first, that "a gasometer containing between 2000 and 3000 cubic feet "of gas exploded, the entire structure collapsing with a "terrific crash, and creating considerable alarm in the "neighbourhood. . . . Four men were engaged near "the gasometer at the time; and these were more or less "seriously injured. . . . Strikers engaged on picket-"ing duty hooted the injured, and expressed a hope that "others were as badly injured. The Managers and Directors "of the Gas Company are convinced that the occurrence "was malicious. They believe that some such explosive "as dynamite was employed for the purpose, and point "to the manner in which the ground is torn up near the "wrecked gasometer in support of their contention." The above tale is from the local correspondent of "The Times." The correspondent of the Press Association reported that "the principal gasometer blew up with a report which could "be heard throughout the city and suburbs." The story runs on that the connections of the holder were cut off, and the gas allowed to burn itself out. This is a reasonable statement. When the holder was burnt out, part of the framing fell, damaging adjacent buildings. The "explosion" took place during the dinner hour; and the gas burnt until five o'clock. This statement points to the intelligible explanation that the "explosion" was the first thing to happen; that it was not the gasholder which exploded, but something brought into contact with it; that the immediate effect of the explosion was to make a hole in the holder and ignite the escaping gas, which burnt quietly enough for nearly three hours; and that the framing, having been damaged by the explosion, collapsed when the holder had sunk too low to keep it in place.

The Press Association appraises the material damage at £2000, and credits the holder with a capacity of 750,000 cubic feet. The same account gave circulation to the humorous suggestion offered on behalf of the strikers that "the disaster occurred through the overcharging of the "gasholder, and that this was due to the ignorance of "unskilled workmen whom the Company have been em-"ploying since the strike." The "Freeman's Journal" report first said that the holder had "nearly half-a-million "feet of gas" in it at the time of the explosion; but a later statement gave it as 750,000 cubic feet. It further said that the wrecked holder was overlooked from the Blackrock Road, and confirmed the other account that the explosion came first and was of extreme violence. "The "blaze was first observed from a portion of the premises "near the Blackrock Road side." All accounts agree on the important points that the explosion occurred about 2.15 p.m., while most of the men on the works were at dinner; and that the gas burnt until about five o'clock. Five persons in all were returned as injured, happily without any deaths. The "Cork Herald" put the contents of the holder at 260,000 cubic feet, and stated that it had stood full since the previous night. This journal gracefully accepted the hypothesis that "the disaster was due to the overcharging of the gasholder "by inexperienced workmen"—the damage naturally taking a whole night and half-a-day to manifest itself.

The strikers and their Trade Union sympathizers held a meeting on the following night, for the purpose of expressing their views respecting the "accident." The speakers very properly repudiated all responsibility for the explosion. The local head of the Gas Workers' Union said he was sorry it had happened, and attributed it to "ignorance." He and some others declared that there was so much more of this peculiarly deadly explosive still on the premises of the Gas Company that "the lives of the citizens were at stake." A Mr. Joseph O'Brien also wrote to the "Cork Examiner" to "help to let the public know if there is no preventative "of being blown up by incompetent gas workers." This gentleman further suggested that the "Labour Party in the "Corporation" might consider the advisability of taking legal advice as to "whether or not they can proceed against "the Gas Company for endangering the lives and property "of the citizens by carrying out the unjust course they have "adopted"—that is, of insisting on being masters of their own business. Altogether, a strange story indeed.

Coal Miners in Congress.

It would be a mistake to attach any large measure of importance to the resolutions adopted by the recent International Congress of Coal Miners; but it would also be a mistake to entirely ignore the proceedings at the congress, inasmuch as they serve to indicate what is principally occupying the minds of the miners in this and other countries, and to give warning of troubles in store. The resolution in favour of an eight-hour day (that "hardy annual") brought forth from the French delegates the cheering intimation that, unless the Government in France proceeds within the next six months to enact that eight hours shall be the maximum number worked in the coal mines daily, there will be a general strike of the miners in that country. We have heard threats of a general strike nearer home than that, which have come to nothing; so there is no immediate ground for alarm on the part of French consumers of coal. Should such a strike occur, it would undoubtedly react upon the British coal markets; for, in spite of the entreaties of the foreign delegates, the representatives of the British miners declined to pledge themselves to strike in "sympathy" with their Continental brethren. As one of the Derbyshire miners put it, they "sympathized with the remarks of the "foreign delegates; but, above all, they must be practical." Which, being interpreted, is to say: We will extend to you plenty of sympathy, but beyond passing resolutions we don't mean to do anything to help you—certainly not anything that means losing the chance of extra wages. The foreign delegates, we fancy, are inclined to wonder whether there is much advantage to be gained by the international federation of miners if it means nothing more than the annual passing of resolutions, which, as one of them put it, seems "a some-"what feeble process."

Then it was resolved, by all the delegates present except those from Durham (who throughout the proceedings gave evidence of possessing an uncommon amount of common sense) "that all nationalities should seek to obtain a mini-"mum rate of wages." In the discussion upon this precious proposal, the British delegates showed pretty plainly that they do not mean to submit tamely to the inevitable reductions in wages which the masters will be asking for in the near future. One of the Lancashire delegates said that their first care should be to maintain "the present rate of "wages"—to make a minimum of the maximum, in short; while Mr. Smellie, the well-known leader of Scottish mining

unionists, said that "it was not unfair to demand that miners "should earn 10s. a day," adding that there was no reason why they should not have it as "the public were willing to "pay for so indispensable an article as coal." The public, unfortunately, have to pay more for coal than they wish to, or than their business can afford, at times of exceptional demand, it is true; but as we have seen of late, high prices bring their own punishment. If, therefore, the coal miners really believe that a rate of wages equal to a charge, on that account alone, of about 7s. per ton of coal raised, can be for any length of time maintained, they are very considerably deluding themselves.

A great deal of this talk is doubtless mere bluff, intended to frighten the owners and the public; but we cannot help fearing that the lessons of former struggles have not been taken sufficiently to heart by the men. It is true that one delegate from Scotland ventured to remind the conference that of the six largest strikes in England only one had been successful. But he was at once sat upon; the next speaker remarking that if that line were to be adopted, it was no use holding such a congress. Evidently the thoughts of the men run almost entirely upon the one subject—that of going out on strike for more wages. In 1893, the Midland miners threw away in sixteen weeks about £6,000,000 in wages, in an attempt to resist a reduction which at the most would have meant a loss in wages of £2,000,000 in twelve months; and apparently the miners generally have up to the present time failed to realize the utter folly of such a policy—to say nothing of its mischievousness.

Yet another resolution adopted (the Durham men again dissenting) was in favour of the acquisition of the mines by the State. The sole reason which induced the miners to favour such a policy was evidently that they thought that political pressure would enable them to get better wages out of the State than out of private employers. The mover of the resolution remarked that "the State as an employer "could always be controlled by public opinion," while Mr. Smellie said that if the mines "belonged to the State, profit "would not be the first object." In other words, if the nation took possession of the mines, the men would expect them to be run for their benefit rather than for that of the nation. Municipal trading has many weak spots; but they appear small compared with the objections to be urged against State control of one of the vastest industries in the country, employing nearly 800,000 men. Fortunately, the proposal is not within the bounds of practical politics, a remark that applies to most of the proposals made at these and similar congresses of the representatives of labour.

Law and Order at Bethesda.

The wretched Bethesda quarry strike drags on through the weary days. We mentioned the subject on the 28th ult., when the management had decided to reopen the quarry, on information received that numbers of the old employees were desirous of returning to work. A circular to this effect was posted, and adequate police protection was promised to those who chose to work. The strike organizers called a "mass meeting" of their supporters on Whit Monday, when it was tumultuously agreed to "continue the struggle," and the reference to the services of the police was laughed at. The sequel to all this eventuated at the Bangor Police Court, on the 4th inst., when several persons were put upon their trial for having participated in disorderly proceedings consequent upon the open preparations at the quarry for the possible resumption of work at the time specified—to-day, in point of fact. Certain officials of the quarry staff were beset on their return from their employment by a mob of strikers and their sympathizers; and legal proceedings ensued. The trial presented features which one is glad to think are not often exhibited in an English Court of Justice. The Chairman of the Bethesda Urban District Council, a pronounced partisan, asserted his right to a seat on the bench, apparently for the first time. He afterwards took an active part in the proceedings, and was told by the prosecuting Solicitor that his conduct was "a disgrace to "the Bench." The accused were convicted, and fined 5s. and costs. In another case, a man was charged with a similar offence; having acted as ringleader of the mob. This time the Bench took a serious view of the matter; but, after warning the offender that he had made himself liable to imprisonment, they let him off with a fine of £1 and costs. After this, it is not at all surprising that a public meeting was held to protest against the presence of the extra police. The gentle souls who beset and hooted the quarry officials would fain have only a single policeman to play with. It is better for them as it is; because then they might get hurt by a nervous man acting in his own defence. The law is now strong enough in Bethesda to keep everybody in order; and if Lord Penrhyn's men, or any of them, elect to exercise their birthright of freedom and go to work, they will be protected in their actions. It is remarkable that this same lesson has to be taught again and again to the deluded persons who allow themselves to be carried away by the windy threats and promises of strike organizers. At bottom, the reliance of all strikers is upon physical force; and in this respect they are on all-fours with the Magistrates. The difference is that the law of the land and its forces are the stronger, and invariably prevail.

Edison's Nickel-Steel Accumulator Battery.

The time has long passed when an announcement of an invention by Edison in regard to an application of electricity could stir the pulses of holders of gas stock. Yet the news which came over from America the other day, to the effect that Edison had made an enormous advance in batteries for the storage of electric energy, is extremely interesting; and the fact, if established, may have widespread consequences. At any rate, the report came very opportunely for giving a send-off to Dr. Mond's nickel venture; and the intelligence has therefore been of some use already. It had come to be very generally agreed that leaden secondary batteries had arrived at the limit of their usefulness, which was much more restricted than was originally expected. For certain purposes, chiefly in connection with electricity distribution for lighting and driving tramcars, the leaden accumulator is distinctly useful; but its advantages drop off rapidly when it is a question of carrying it about. Its great weight, and the necessity for avoiding reduction of the charge below a relatively high proportion, militate against its successful employment for free traction purposes, which is perhaps the largest field immediately open for the commercial application of stored electricity.

It is claimed that Edison's new battery is competent to give a fresh start to electric traction by means of portable accumulators. It is reputed to be much lighter than the leaden cell. Whereas the storage capacity of the leaden accumulator is from 4 to 6 watt-hours per pound of battery, that of the Edison cell is put at 14 watt-hours per pound. Expressed in a different way, while the leaden battery weighs from 124½ lbs. to 186½ lbs. per horse-power-hour available at its terminals, the Edison cell is to show the same power for a weight of only 53⅓ lbs. It is also to be inexpensive, able to withstand a good deal of rough usage, and not be liable to easily deteriorate under considerable variations of the rates of charging and discharging. The negative pole is iron. The positive pole is a superoxide of nickel. It is therefore a nickel-steel cell. The electrolyte is a potash solution. The cell can be discharged in 3½ hours at the normal rate; or it can be discharged at a high rate in 1 hour. Similarly, it can be charged at either rate, without any detriment, except a somewhat lower efficiency. The cell is described as an "oxygen lift." Charging pulls the oxygen away from the iron and delivers it temporarily to the nickel. The condition is then stable, until the circuit of the cell is completed. Discharge then allows the oxygen to fall back from the nickel to the iron, with which it has so strong an affinity. The potash solution is merely the vehicle for this travel of the oxygen. Cells may be completely discharged. The battery is not to cost more than the ordinary leaden accumulators. It now remains to see how much of this promise will be realized. In the first place, the weight of free traction batteries should be reduced to one-fourth, which ought to put the electric cabs on the streets again.

Two Points of Municipal Trading.

In the course of an article on "Municipal Trading in Elec- "tricity and other Commodities," a writer in "The Times" draws attention to the privileges enjoyed by local authorities under the Public Authorities Protection Act, 1893. This enactment was passed for the express purpose of discouraging unnecessary or vindictive litigation against a public authority for acts done under statutory sanction. It directs that any action or prosecution brought against any person in respect of an act committed under an Act of Parliament, or in accordance with any public duty or authority, must be commenced within six months of the act complained of; and if judgment is obtained by the defendant, it shall carry

costs as between solicitor and client. The writer points out that the statute is a very proper one so long as its provisions are confined strictly to cases concerning the true public duties of a public authority; but when the Act applies to traders who are municipal bodies, and not to traders in the same line of business who are not of this category, there seems to be cause for complaint. A gas company derives its powers from an Act of Parliament, but cannot claim the protection of the Act of 1893. A corporation gas department is so protected.

This means that a person deeming himself aggrieved by a corporation gas department, and minded to seek his remedy at law, has to take proceedings within six months, and run the risk of paying all the expenses of the other side if he fails. In the case of a company, he has much longer time to think it over; and the costs he will have to pay if he loses are much smaller. There are many causes in regard to which the protection of a trading municipality by the Act of 1893 might constitute a denial of justice—such as well pollution, light and air cases, infringements of patent right, and so forth. Whenever municipal trading is taken into consideration by Parliament, this abnormal legal privilege will require special attention.

Meanwhile, there is a peculiar kind of municipal trading which enjoys a mixed reputation. Whether it is carried on at a profit or not, some people do not admire it. We allude to the institution of municipal public-houses. An interesting letter on this subject from Mr. Andrew Morris, of the United Kingdom Alliance, recently appeared in the "Standard." The writer described what is being done in this line in Fifeshire. Although not precisely a municipal body, the Fife Coal Company volunteered to act as such for Hill-of-Beath, if a licence, which a publican was applying for, were granted to them instead. The Company offered to run the house for the benefit of the village; and that the enterprise is popular is testified by the fact that the annual takings are about £2250. For a population of about 1300 this is not bad business. As the result of the apportionment of profits, the village has been lighted with electricity; a bowling-green has been made; and a village institute was started, and is now being rehoused. The United Kingdom Alliance shakes its head over this account—evidently thinking that to cast the respectable mantle of public interest over public-house entertainment is certainly not the way to make the latter disliked.

Professor Ramsay on the Examinational System.

It is extremely refreshing, in these examiner-ridden days, to come across such a bracing, breezy denunciation of the evil of the modern examination system of what is falsely called education, as that delivered by Professor Ramsay at University College last week. We have become so habituated to the system, as an essential feature of all kinds of public and private instructional work, that it is almost a surprise to be reminded by Professor Ramsay that it was started merely to cure the abuses of the Civil Service of the country. From this respectable, but not particularly noble, origin, the examination system has eaten into the vitals of our educational organization like a canker. It has created a worse abuse than itself, in fostering the award of scholarships as prizes to be gained by examination. Professor Ramsay calls this process the pauperization of the wealthier classes of the country, inasmuch as the prizes of examination are apt to go to those who are able to pay for the cleverest preparation.

It is sufficiently notorious that the original idea of those who threw various prizes into the educational arena, to be scrambled for by examination, has mostly miscarried. The idea at its best was to open careers for those who, whatever their social condition, had the native talent and the training necessary to satisfy a reasonable test of capacity and acquirement. It was a plausible and an amiable notion; but the results have been disappointing. The really good prizes still go to the same class of the community as before, with the difference that the crammer has to be paid for doing his part as substitute for my Lord Privilege. As to the lower places in the Paradise to be entered through the Examination Hall, they are filled by people who have been made non-producers for life in recognition of their precocity at school. It is not too much to say that the doings and example of the Civil Service Commissioners have fostered throughout the elementary schools of the country a false and mischievous desire on the part of the brightest children to seek clerical employment, instead of taking to productive work. And what the Civil Service spares, the Board School sweeps into the "pupil teacher" collection.

Nor, when one turns to the products of the higher science and technical examination system, is it possible to admire the quality of the ordinary run of graduates. There are bright exceptions, of course. Examiners cannot crush all the best men; but there is room for wonderment sometimes how certain individuals ever managed to scramble through. A sort of early forced specialization, it is to be supposed, has a great deal to do with this scandal of the examinational system; but, whatever may be the cause, the result is distressing. Professor Ramsay declares for a University which, while it teaches some things, rewards its faithful *alumni* with the love of knowledge and the inspiration of the philosophical spirit. Which is better for a man beginning the world—a certificate of an Examining Board, or command of the scientific method and an unquenchable desire to use it for the enlargement of knowledge? Unhappily, the established practice has gone far to render the two gifts incompatible. A man may either read for an examination, or he may study with the intention of mastering the subject. He can rarely hope to combine the two, their fruits being so different. The examination system, moreover, makes for the dissemination of knowledge, up to an arranged standard. It does not help to advance knowledge, which is really the more needful thing. Better one man who can do something on his own account, than a thousand who can only sit down and write off statements of what others have done.

WATER AFFAIRS.

The Conservation of the Thames.

In view of the important part played by the noble river which flows through the Metropolis in providing the inhabitants with a supply of water, special interest attaches to the reports issued year by year by the body who are responsible for its condition. The one recently issued, recording the results of the work of the Thames Conservancy Board during the past year, affords satisfactory proof of their vigilant supervision of the stream all along its course. With what is called the Lower Navigation, however, we are not concerned; the water which is drawn from the river for the supply of London being, as is well known, taken from the upper reaches, above tidal influence. It is therefore gratifying to find that this portion of the Thames has been placed in the charge of a chief inspector, who, with four assistants, will have control of the river from Cricklade to Teddington, which is divided into four sections. This additional inspection must result in ensuring greater freedom from pollution, to which the attention of the Conservators is unceasingly directed. During the past year, no less than 32 towns and villages, representing a population of upwards of 80,000, diverted objectionable matter from the streams flowing into the river; whereas in 1899 the number was only 17, and the population about 36,000. So that in two years the labours of the Conservators and their officials have had the effect of diverting from the river a possible source of pollution from 116,000 persons. Wherever drainage arrangements have not been put upon a satisfactory basis, pressure has been brought to bear upon the responsible Local Authorities, with the view to the adoption of such measures as will prevent the contamination of the water. Legal proceedings were instituted in sixteen cases; and in five of them convictions were obtained. The inspection of farms, manufactories, private residences, and other scattered premises, was continued last year, and pollution was diverted in 126 instances. Nor were houseboats and launches neglected. These vessels were closely watched by the inspectors; but no case of pollution was detected. Steady perseverance in work of this kind must have a highly beneficial effect upon the character of the stream as a source of water supply.

From quality we turn to quantity; and in this respect it is satisfactory to find that the river maintained its flow, even in the driest months of last year, at a considerably higher level than during the dry season of 1899. For example, in that year the supply in June fell off, and in the succeeding three months the average flow over Teddington Weir was much below 200 million gallons per day; while in the past year the figures for June were 443 million gallons, and those for the following three months 247, 244, and 199½ millions respectively, or an average of 230 millions daily for these

months. As this was the bulk of water flowing over the weir after the Water Companies had taken their legitimate quantities, it cannot truthfully be asserted that their operations had the effect of "depleting" the river. Of course, it is necessarily being drawn upon to a larger extent year by year; two of the Companies—the Lambeth and the East London—obtaining Acts last session authorizing a further abstraction when the flow over Molesey Weir is not less than 190 million gallons per day; and the gigantic reservoirs now in process of construction in the valley of the Thames will have to be filled from this bountiful source. But we hold firmly to the belief that for a long time to come it will be equal to meeting the demands upon it. With an adequate quantity assured, and its quality improved by the combined efforts of the Conservators and the Water Companies, we do not think those who are responsible for the water supply of the Metropolis will find it necessary for many years to have recourse to a distant watershed.

A Successful Municipal Water Undertaking.

THE particulars given in another part of the "JOURNAL" in regard to the progress of the water undertaking of the Sheffield Corporation in the financial year ending the 25th of March last, furnish ample justification for congratulating all who are concerned in its management on the success which has attended their labours. There was an increase of 9980 services; bringing up the total number (domestic and trade) to 132,802. This was due rather to the growth of the city than to any special efforts to "push business;" the supply of water being different from that of any other necessary of life. Nevertheless its effect was to help the Water Committee to realize the extra 50 per cent. profit shown by the accounts; for the net result of the year's working was a sum of £32,334, against £24,186 in the preceding twelve months. After setting aside £6850 for the redemption of annuities and the extinction of loan indebtedness, the Committee find themselves in possession of a net surplus of £25,483, or £8445 more than they had this time last year. This result has been attained, as Mr. W. Terrey, the General Manager, points out in his report, notwithstanding the reduction, from Dec. 25, 1897, of half the 25 per cent. by which the Sheffield Water Company—the predecessors of the Corporation—were authorized in the year 1864 to increase their charges, in order to compensate them for the loss sustained by the bursting of the Dale Dyke reservoir. This additional charge was granted in perpetuity; and it speaks well for the management of the undertaking that the consumers have not only been relieved of half of it since the beginning of 1898, but that the rest of the burden will be removed in the course of the next few months. After discharging all liabilities, including the payments into the sinking fund, there was a total surplus of £76,179 at the close of the financial year. This sum, which shows in a very striking way the progress made with the undertaking since its transfer to the Corporation, is not to be handed over for reducing the district rate, as doubtless many would wish it to be, but will be held in reserve to meet charges accruing in connection with the works which are being carried out in the Little Don Valley. The outcome of the labours of Alderman Gainsford and his Committee has been the relief of the consumers, and, concurrently therewith, the strengthening of the works; and the achievement merits recognition as an example of good municipal administration.

Mr. J. Hubert Wright, of the Hendon Gas-Works, Sunderland, has been appointed to the position of Station Superintendent of the Effingham Street works of the Sheffield Gas Company.

The Gas and Electricity Committee of the Aberdeen Corporation have arranged that Mr. A. Smith, the Gas Engineer and Manager, shall take a long holiday on account of illness. During his absence, his duties will be discharged by the Assistant-Engineer, Mr. S. Milne.

On the occasion of the marriage of Miss Eleanor Padfield, only daughter of Mr. W. A. Padfield, Engineer of the Exeter Gas Company, to the Rev. J. Hugh Cooke, M.A., LL.D., of Trinity College, Dublin, the employees of the Company at the Basin works presented the bride with a handsome hall clock, with barometer and thermometer combined, and the staff at the offices gave her a valuable carved oak clock, with Westminster chimes.

A familiar face at the meetings of the Gas Institute will be missed at the gathering of the members of that body this week, as we regret to learn that Mr. John Cockcroft, the Engineer and Secretary of the Littleborough Gas Company, is so seriously indisposed as to be unable to leave his house. We are sure his professional brethren will sympathize with him in his illness, and will join with us in expressing a sincere wish for his recovery.

THE INCORPORATED GAS INSTITUTE.

PROCEEDINGS AT THE THIRTY-SEVENTH ANNUAL GENERAL MEETING,

HELD AT THE

ROYAL UNITED SERVICE INSTITUTION, WHITEHALL,

JUNE 11TH TO 13TH, 1901.

Mr. T. ORMISTON PATERSON, M.Inst.C.E., President.

INAUGURAL ADDRESS.

Gentlemen,—It is the custom in our Institute for the President to wait twelve months before he can return thanks to the members for the honour of his election. I now avail myself of that opportunity, and offer my sincere and warm thanks for the honour you have conferred upon me. It is a position probably envied by all; but at the same time it carries with it responsibilities and duties which cannot lightly be disposed of. Thirty-five summers have passed since the foundation of the British Association of Gas Managers; and during that long period, the presidential chair has been occupied time after time by stalwart and strong men representing the cream of our profession. They, and those before them, may very properly be called the "masons" of our industry; as they have nobly built a structure which has withstood all the gales of competition during the past century. Therefore, as the last representative, I deeply feel the responsibility of my position.

Gentlemen, this is to us indeed a New Century in many respects, as it is just one hundred years since the illustrious Murdoch distilled coal, and applied the gas resulting therefrom for lighting purposes in a practical way. What a glorious vista was then opened out; what an enormous power was then released from the bonds of Nature. Locked up for millions of years, the vast secret, the importance and gravity of which is beyond conception, was at last unmasked; the world so to speak became associated with a new partner.

Murdoch was not slow in making his great discovery known to the leading men of his period, as we find that in 1805 he gave a full account of the lighting of the cotton mills of Messrs. Phillips and Lee, of Manchester, in a paper read before the Royal Society in February of that year. In that communication, it is of considerable interest to find that the price of Wigan coal and cannel at that time was practically the same as the price ruling before the last great rise in the coal market. Coke realized 26s. 8d. per ton; but tar and ammoniacal liquor were then of no value.

Following rapidly upon the successful experiments of Murdoch, we find that a Company was formed and applied to Parliament to be incorporated under the name of "The London and Westminster Chartered Gas Light and Coke Company." Messrs. Watt and Murdoch opposed the Bill, with the result that it was thrown out; but in the following year it was passed. This, the first incorporated gas company in the world (and now known as the Gaslight and Coke Company), was in 1813 nearly at the point of dissolution, owing to capital expenditure and no profit, when Mr. Clegg joined it as their Engineer. Great and prolonged prejudice against the introduction of gas was evinced by the public, and (to their discredit) by men of science; and for a period it was found necessary for the Company to fit up shops and houses with pipes and supply the gas free of cost, in order to overcome this opposition and prejudice.

We all have our troubles at the present day, in the conduct and management of gas undertakings; but it was our forefathers who manfully fought the battle against great odds. They had no precedents to refer to; no plans or specifications to guide or assist them in the construction of plant—everything had to be invented from the active minds of a few men. Great engineering difficulties were cast upon these men, from all sides, from ignorance. As an instance, several members of the Royal Society were deputed to examine and report upon the gas apparatus used by the Chartered Company; and they strongly recommended the Government to compel the Company to use gasholders containing not more than 6000 cubic feet, secured in strong buildings. And the Chartered Gas Company were for many

years obliged to erect their holders in that way, at great cost. Sir Humphry Davy twitted Mr. Clegg by asking him the question "whether it was his intention to take the dome of St. Paul's for a gasometer." It is not too much to say that at the present day the smallest villages supplied with gas possess a holder not less in capacity than the dome referred to.

Difficulties innumerable were met with from every side; but, by dint of courage and ability, they were met and overcome. In Samuel Clegg's work of 1846 it is stated that the first public lighting of note was that of Westminster Bridge, on Dec. 31, 1813. It is on record that the novelty attracted many people to see the new light. But even in this affair the Engineer (Mr. Clegg) had himself to light the lamps for several nights, as the oil-lamp lighters were all afraid of the new system, and declined to act. The parish of St. Margaret, Westminster, claims the credit of being the first to enter into a contract to light their streets with gas. In 1814 the old oil-lamps were removed, and gas was substituted. It is very amusing to read of the oil-lamp contractors making complaint to the Board of Guardians. One of them, when told by the Board that his lamps gave no light, replied that "this was not in his contract, which only stated that they were to be lighted from sunset to sunrise." This was literally the case. Lighted they were; but of light they gave none. About this period the Chartered Company seem to have surmounted the principal difficulty, so much so that companies were formed, and began to erect works in different towns, for the supply of gas.

I think it is of sufficient interest to us to repeat what occurred in gas illumination at the Peace of June, 1814, when the allied Sovereigns visited England. The following is an extract from "Clegg," which clearly sets forth the scheme:—

> The principal illumination was a pagoda erected by order of Government, in St. James's Park. This pagoda was octagonal, composed of wood, 80 feet high, at each angle of which a perforated pipe was fixed. A projecting pipe was also placed at every angle of each storey, in the form of a griffin's head, pierced with small holes, through which issued jets of gas. At the lowest orifice of each perpendicular pipe a small oil-lamp was concealed, which, when lighted, ignited the first jet of gas; this communicated the light to the next jet, and so on to the summit. The burners of each angle were thus simultaneously ignited, and the gaslight rose into the air with the majesty of a rocket; and the pagoda (illuminated by more than 10,000 burners) was fired in a few seconds, the whole appearing like a mass of living light. This device was fortunately exhibited to the Prince Regent and most of the Royal Family, at their request, on the night previous to the general illumination. Their Highnesses walked in Carlton Gardens to witness the effect, and expressed great approbation. The night on which this first grand display of gas lighting was to have been exhibited to the public, Sir William Congreve, contrary to Mr. Clegg's advice and request, insisted upon letting off fireworks from the pagoda before the gas should be turned on. The consequence was that the whole erection was burnt to the ground. The accident was not only mortifying on account of expense and trouble incurred by the Gas Company in this affair, but still more unfortunate as gas lighting had been only lately introduced, and all new schemes (as great improvements are generally called) have many enemies. A report was spread abroad next day that the gas had set fire to the pagoda; the public were never entirely undeceived.

I hope you will forgive me for taking up so much of your time in giving this long extract; but it is so well written, and portrays so clearly the incident at a very critical period of gas lighting, that I have ventured to risk your displeasure in doing so.

When one reads the early history of gas, there are so many interesting points that present themselves to the reader that it is difficult, and indeed impossible in a short address, to even touch upon more than a few of very special interest. I venture to give one more extract, because it is a magnificent testimonial to gas. In 1815, the Guildhall was lighted with gas, and the following is an extract from one of the papers of the day commenting upon it:—

> *Lord Mayor's Day.*—Yesterday this annual ceremony was celebrated with more than usual display; but the great and striking attraction was the renovated appearance of Guildhall. It would not be very easy to conceive a more imposing spectacle than was presented when the whole company sat down to dinner. The profuse delicacies of the table, the waving feathers and sparkling jewels of the ladies, the mild splendour of the gas shedding a brightness clear as summer's noon, but undazzling and soft as moonlight, altogether formed a magnificent combination worthy the inauguration of the presiding citizen of the great city. Those who have been used only to the brilliancy of oil and candle light can have no adequate idea of the effect of an illumination by gas. It so completely penetrates the atmosphere, and at the same time is so genial to the eyesight, that it appears as natural and pure as daylight, and it sheds also a warmth as purifying to the air as cheering to the spirits.

Without such brilliant testimonials, at the present day we more than hold our own; but at the same time it would do no harm if the gentlemen of the Press gave us even justice at all times.

Having briefly skimmed over the earliest and the interesting days of our industry, I will now trouble you for a very short time about things of our own day. I think you will agree with me when I say that nearly every subject treated in a Presidential Address could be made the theme of a special paper. Thus, if I possessed the ability required, this address would bulk out to the ordinary size of our annual "Transactions." You will be glad to know it is not my intention to embark on any such scheme, but rather to make some observations on current questions.

We may well ask ourselves at the beginning of this century whether we have properly maintained and upheld the high standard of excellence of those men who formed our industry. I am inclined to think we have not. A hundred years have gone by; but of those years many were allowed to pass without any visible advancement or improvement. The original lines were adhered to both in the construction of plant and the management of undertakings. Everybody seemed to rest contented so long as the dividend was paid. Then again, gas being almost a necessity, and the right of supply a monopoly, tended together to lull all concerned into a sweet slumber of peace and security. Of course, there were some exceptions to the rule; but previous to a serious competitor appearing on the field, there was a considerable period of lethargy. Some may say there was no necessity to drive the gas coach any harder, so long as the right of road was held. In answer to this it may well be said that, had the coach been driven as hard forty years ago as it has been during the past fifteen to twenty years, the natural inference is that our position to-day would have been stronger, our knowledge of intricate matters greater, and the field of our operations expanded far beyond the present limits.

Everything connected with gas is now in a much healthier condition than that existing at the earlier period named. The public are more in touch with those entrusted with the conduct of the gas supply, and, to a certain extent (but only to an extent), irritating obstacles in the shape of preliminary charges to the would-be consumer have been swept away. There are, however, many towns yet where, before a supply of gas can be obtained, a deposit is required, service-pipe and meter fixing must be paid for, and on the latter a quarterly rental is charged for using it. Allowing for ordinary business caution, which must be exercised in special cases, I do not hold with a single charge as above enumerated. We manufacture a product, just the same, for instance, as a brewer manufactures his beer or his stout; the only difference being that our product contains no arsenic. The brewer sells his product in barrels; but he makes no charge to his customers for the use of those articles. There is unquestionably an item deep down somewhere in the net cost of the beer which covers interest, wear and tear, &c., on these; but the consumer troubles not to find it. In point of fact, the brewer is not a cask manufacturer; his primary object in life is to make and sell beer. Now, what is our object? Is it to make profits by the employing of gas-fitters for the fixing of meters, cooking-stoves, gas-engines, gas-fires, and gas-fittings, or, in addition, is it to derive something from the service layer? I venture to think no gentleman present will admit that to be his aim or object in the conduct of his works. His aim undoubtedly is to spread his gas broadcast, without let or hindrance.

Some of these charges, however, are made, I believe, in most towns. They are not unjust; but they are misleading to the public, and are responsible for untold harm to the industry. How much better would it be to absorb these charges direct in the price of gas. Is there any insuperable difficulty in achieving such a consummation?

Day Load v. Night Load.

It is just about seventeen or eighteen years since an important development of the day consumption of gas commenced. Previous to that time, the public generally knew little or nothing about gas cooking-apparatus or gas-fires; and it devolved upon the engineer or manager of gas-works to arouse the people, and show them, by practical methods, what great advantages were being held out to them in the shape of gas cooking-ranges and gas-fires. Only gas companies and corporations then held exhibitions for the purpose of demonstrating to their customers the advantages to be gained by using gas for cooking, heating, and, to some extent, for power.

In some towns, determined opposition was met with—due to coal merchants, ironmongers, and gas-fitters. No

doubt the coal merchant has suffered some diminution in particular accounts; but ironmongers must have equally gained, owing to gas undertakings opening up and establishing a large business for them which previously was non-existent. It is quite usual now to see shops well stocked with gas-fires, gas-stoves, and other appliances connected therewith. But such exhibits were not in existence eighteen years ago; and if those responsible for the conduct of gas-works had not taken the initial steps, and pressed home their arguments, such exhibits very probably would not be in evidence to-day to any considerable extent.

After but a few years of steady growth in this particular branch, it was found that the daylight consumption began to move slowly upwards. The dormant and torpid condition of things gave place to a healthy, profitable, and ever increasing business, at the same time knitting closer and closer the relationship between consumer and manufacturer—a condition of things which is of the first importance.

After the stove business was fairly launched and booming, another tradesman (of whom we hear so much) came along with an instrument so constructed as to be able to sell gas in pennyworths. Many wise heads shook pendulum-like when asked their opinion of this latest innovation. Many were of opinion that they possessed no scope in their particular towns for penny consumers; others thought the enterprise lacked commercial foundation, and was of little value, as the expenses attached to the working would absorb any profit made from the gas sold.

You know, gentlemen, what success has attended the innovation, what results have been achieved since the introduction of prepayment meters; and therefore it is unnecessary to waste more of your time. I, at least, am perfectly satisfied in being able to pile on increases of 6 per cent., alongside our friendly competitor, the electric light.

The following table gives the day and night consumption in Birkenhead before and since the introduction of gas stoves, fires, and prepayment meters. It will be seen that, over the period taken, between 1884 and 1901, the total consumption of gas has just doubled; but in taking the day consumption during the summer six months of such period, the output has increased over five times, thus showing what valuable use is being made of plant which previously lay unproductive in these months. As an instance, take the month of August, 1884. It will be observed that the night consumption was eight times that of the day consumption; whereas in the same month of last year, the night consumption was not quite 2½ times that of the day consumption. By granting still greater facilities to the consumer, especially in that section using gas for power and heat, we may reasonably expect the disparity yet existing between day and night consumption to be further reduced. Moreover, we shall have brighter skies and cleaner towns, when the smoke-pall now overhanging our towns and cities has disappeared.

Comparative Statement of Monthly Consumption of Gas for the Years ended March, 1884, and March, 1901.

Date.	Consumption in 1884.		Consumption in 1901.	
	Day.	Night.	Day.	Night.
April	2,964	22,470	8,789	32,167
May	1,717	13,626	8,580	26,157
June	1,394	9,864	7,945	20,623
July	1,537	9,943	9,258	21,852
August	1,727	13,543	11,230	26,365
September	2,104	19,119	11,436	33,369
October	5,797	25,089	16,581	45,370
November	11,572	26,554	26,268	46,413
December	16,309	29,706	32,408	49,787
January	15,935	29,975	31,864	50,709
February	8,269	25,913	21,718	44,519
March	4,191	20,831	17,016	45,147
Total	73,516	246,633	203,093	442,478

Calorific Values of Gases.

The gradual changes that have been taking place for some years in the domestic and commercial applications of gas, have recently become more marked and definite, and necessitate a review of the existing methods of manufacture, to determine whether they are in economical accord with the demands of the consumer. For both indoor and outdoor lighting, the incandescent burner is replacing the flat-flame; and this movement will be greatly accelerated with a free trade in burners and mantles. For cooking, heating, and power purposes, gas is being more generally and extensively used, as is evidenced by the steady approximation of the day to the night load in consumption. Consideration, therefore, of the heating power of gas becomes of primary importance; and I dare to say the time is not far distant when the standard of calorific power will be substituted for the present standard of illuminating value.

To ascertain the relation between the calorific and illuminating powers of gases of varying qualities, I have made experiments on gases ranging from 21·5 candles down to 13 candles; and I append the results in tabular and graphic form. The coals from which these gases were produced are as stated; the higher qualities being obtained by an admixture of Lancashire cannel, and the lower qualities by an increase in the temperature of carbonization with resultant high makes. The calorific powers are calculated in British thermal units per cubic foot of gas, corrected to 60° Fahr. and 30-inch barometric pressure.

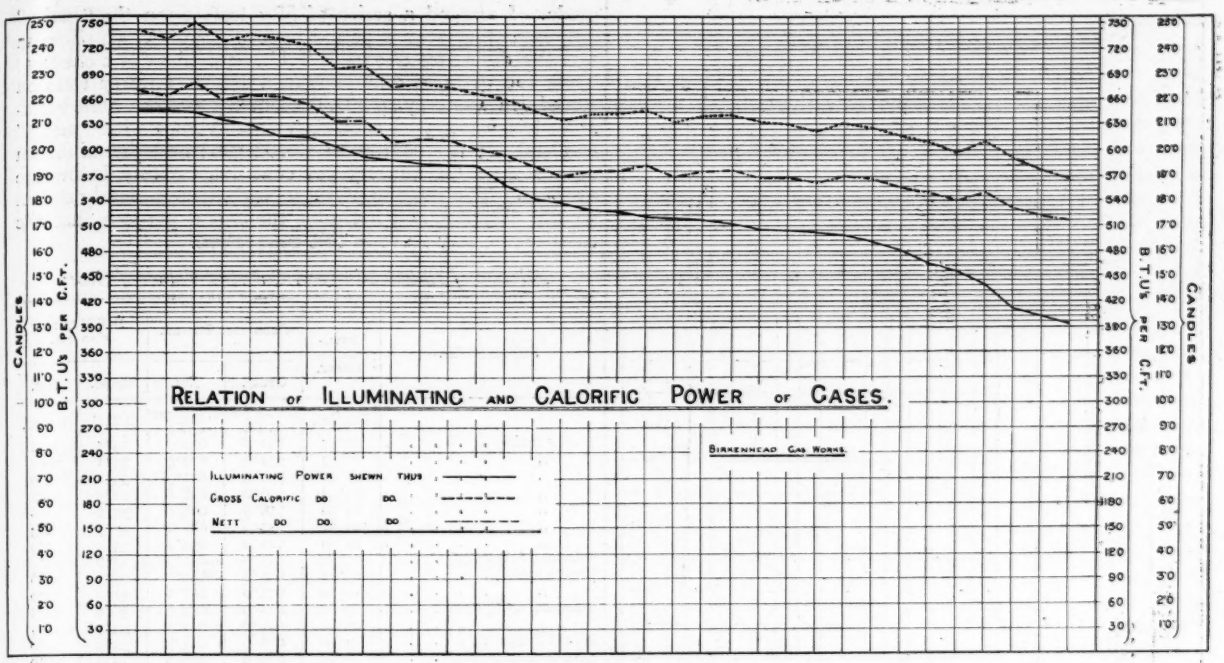
The illuminating power tests were made with candles as the standard, the rate of gas burnt in the standard argand being such as to develop the maximum illuminating power. The results bear out the already well-known fact that the calorific power is not reduced *pro ratâ* with the decrease in illuminating power; or, in other words, that a higher calorific duty per candle is obtained with a reduction of illuminating power. The calorific duty of gases from 21·5 to 18 candle power is shown to be practically constant, at 34·9 B.T.U. gross and 31·6 B.T.U. net per candle; though from 18 candles downwards, these figures are increased to a maximum of 43·5 B.T.U. gross and 39·4 B.T.U. net per candle, for 13-candle gas. The results also indicate that the calorific duty for gases under 13 candles becomes rapidly greater till infinity is reached with a non-luminous gas.

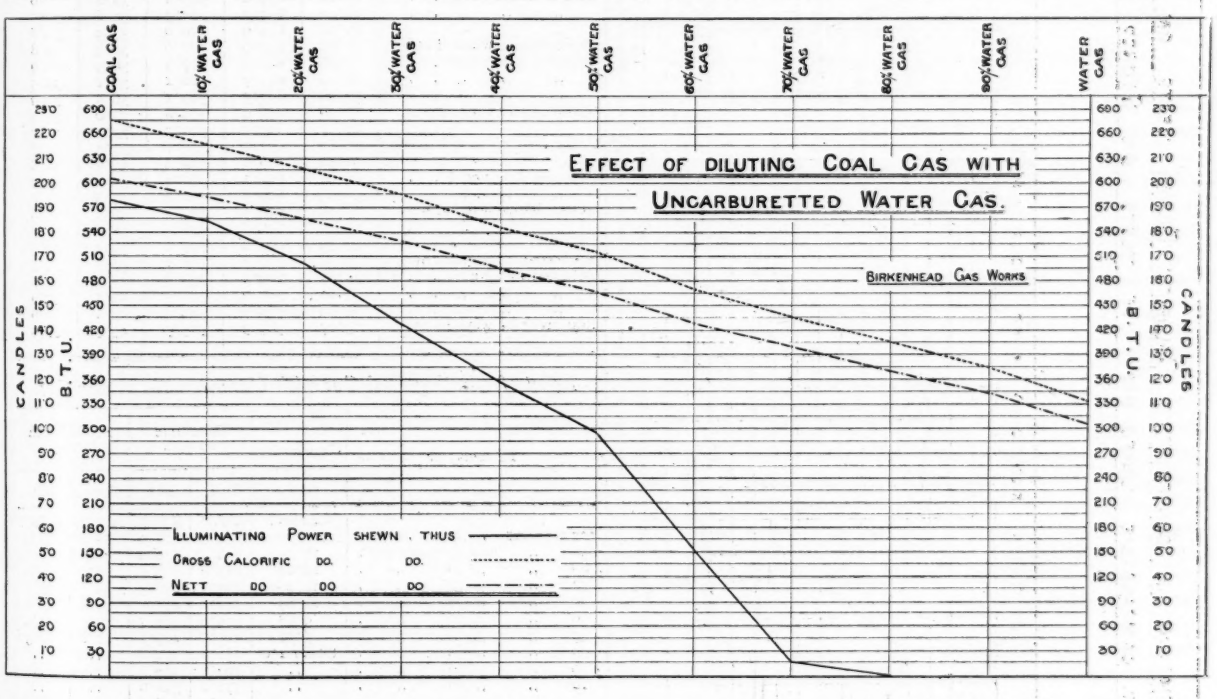
That the calorific duty of coal gas varies very considerably with the different coals carbonized, is instanced by the figure of 40·6 B.T.U. per candle (presumably net) given by Mr. J. W. Helps for 14·5-candle gas produced from Durham coal; and that of 60·6 B.T.U. per candle quoted by Mr. Webber for 10-candle gas from Westphalian coal.

The valuation of the calorific power of gas from low-grade coals, and the determination of the calorific value per ton of coal, as is done in the case of sperm value, affords an interesting and important field for investigation. It must not, however, be overlooked that a reduction of the illuminating power results in some decrease of calorific power, although a higher calorific duty per candle is obtained. This decrease would depend upon the nature of the enrichment process that was partially or wholly suspended. Taking the case at Birkenhead, where 20·5-candle gas obtained by cannel enrichment is supplied, the reduction in illuminating power if enrichment was abandoned would be (say) from 20·5 candles to 16 candles, or 22 per cent.; and the reduction in calorific power, from 650 B.T.U. net to 555 B.T.U. net, or 14·6 per cent. With the cost of unenriched coal gas into the holder at (say) 11d. per 1000 cubic feet, we obtain 50·5 B.T.U. net per 1d. per 1000 cubic feet; while the added enrichment, which cost (say) 3·5d. per 1000 cubic feet for the 4·5 candles, only increases the calorific power by 27·1 B.T.U. net per 1d. per 1000 cubic feet. The comparative calorific values of the unenriched 16-candle gas and the enriched 20·5-candle gas would be as 50·5 B.T.U. net, against 44·8 B.T.U. net per 1d. per 1000 cubic feet respectively.

I am not able to submit figures showing the calorific power of coal gas enriched with benzol. But the evidence points to the fact that the increase in illuminating effect greatly exceeds the increase in calorific power; and any advantage that this process of enrichment may possess at the present time in economically raising the illuminating power is not maintained if the comparison is made on the calorific basis.

I give the results of experiments made to determine the effect of diluting coal and cannel gas with uncarburetted water gas. Starting with coal gas of 19¼ candles, the illuminating power fell with increasing rapidity as each 10 per cent. of straight water gas was introduced, until, with 70 per cent. of the latter product, the luminosity of the coal gas was destroyed. The reduction of calorific power was, of course, much less, and followed very closely the calculated calorific values of the respective mixtures. It would appear that, even with enriched coal gas, the admixture of 25 per cent. of uncarburetted water gas—a proportion below which it would not be economical to produce—reduces the net calorific value of the mixture to 542 B.T.U.; while if





unenriched coal gas was taken as a basis, this would become 491 B.T.U. net, at which point the increased cost per calorific unit for distribution would tend to nullify the advantage of the reduction in the cost of manufacture.

The candle power per cubic foot obtained from gas consumed in incandescent burners is stated by Mr. George Livesey, in his paper on "Enrichment of Coal Gas,"* to increase, rather than fall, with a slight reduction of calorific power; but it may be pointed out that the Dessau figures quoted were obtained under conditions that would not exist in actual working.

The conclusion arrived at from the researches of Messrs. Hermann Russell and Alfred H. White, given in their paper on the "Relation of Heating to Lighting Power of Gas," read before the Michigan Gas Association,† was that the duty per cubic foot of gas consumed in incandescent burners was dependent upon the calorific power of the gas; and this is confirmed by the results of experiments made at Birkenhead on straight water gas. A reduction of illuminating power would, however, reduce the liability to the blackening of mantles that exists with the higher-quality gases. It would also appear that low-grade gas is more suitable for motor purposes, as greater uniformity in its calorific power is ensured, and possibly a higher heat efficiency obtained.

With the manufacture of coal gas, the variations in the quality that are inevitable in the daily working are proportionately much less in calorific compared with illuminating value. Taking the case of coal gas ranging from 16·6 to 15·2 candles, which would fairly represent the fluctuations occurring in practice, we have an extreme difference of 1·4 candles, or 8·4 per cent., on the higher figure; while the calorific values for the same qualities are 570 B.T.U. and 540 B.T.U. net—an extreme difference of 30 B.T.U., or only 5·3 per cent.

I am of opinion that the supply of unenriched coal gas would be of advantage to the consumer, who would receive, at a cheaper rate, a gas eminently suitable to his requirements, as possessing an increased calorific power, per unit of cost, and not uneconomical as an illuminant if consumed in a flat-flame burner; while the manufacturer would be relieved of the difficulties and expenses attending enrichment, and would be given a wider choice in his selection of coals.

While on the subject of the calorific power of gas, reference may be made to the value of the calorimeter as a reliable and speedy check upon the quality of the gas as

* See "JOURNAL," Vol. LXXV., p. 1200.

† See *ante*, p. 879.

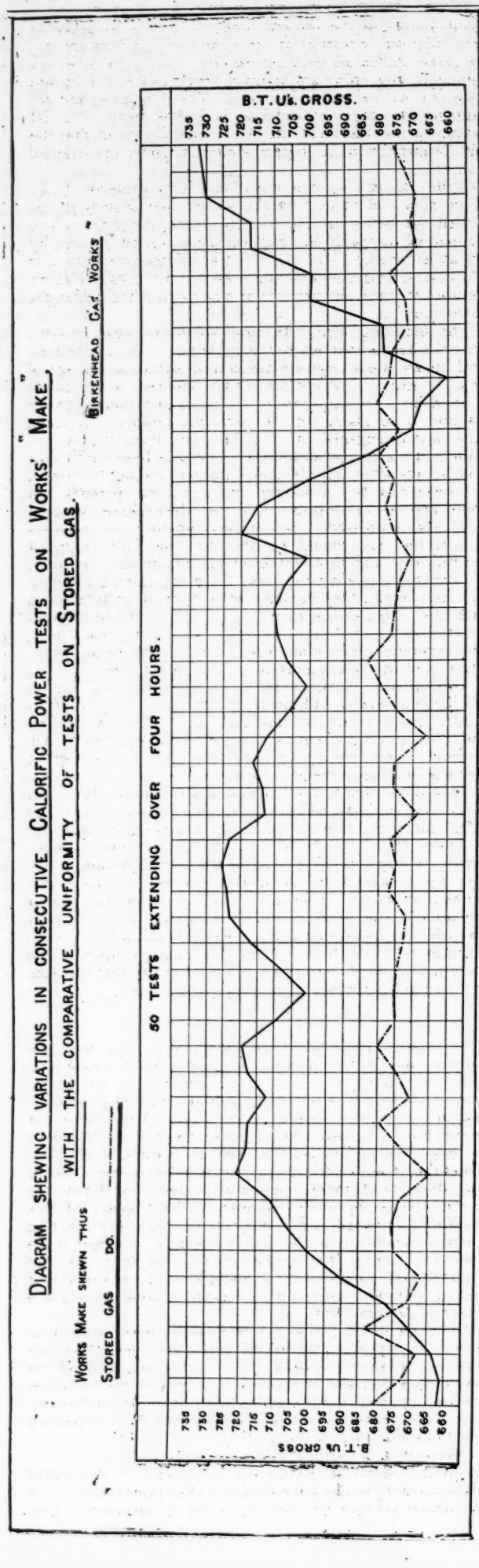


DIAGRAM SHEWING VARIATIONS IN CONSECUTIVE CALORIFIC POWER TESTS ON WORKS' "MAKE"
WITH THE COMPARATIVE UNIFORMITY OF TESTS ON STORED GAS.
BIRKENHEAD GAS WORKS
WORKS MAKE SHEWN THUS
STORED GAS DO.
50 TESTS EXTENDING OVER FOUR HOURS.
B.T.Us. GROSS.
B.T.Us. CROSS.
735 730 725 720 715 710 705 700 695 690 685 680 675 670 665 660

made. I append a series of fifty tests upon the "make" gas, extending over a period of four hours, which show an extreme difference of 71·8 B.T.U., equivalent to 2 candles; while the greatest difference in a series of thirty tests on stored gas was only 19·2 B.T.U., or 0·5 candle. The maximum test was 4·3 per cent. above the average with "make" gas, and 1·3 per cent. with stored gas; and the minimum figures were 6·2 and 1·5 per cent. respectively below the average. The relation of these variations is clearly shown on the diagram, and indicates the useful purpose that the calorimeter may serve in this connection.

Relation of Illuminating and Calorific Values of Gases.

Source of Gas.	Illuminating Power.	Calorific Power.		B.T.U.'s per Candle.	
		Gross.	Net.	Gross.	Net.
	Candles.	B.T.U. per C. Ft.	B.T.U. per C. Ft.	B.T.U.	B.T.U.
Works make	21·55	742·8	670·7	34·5	31·1
,,	21·53	734·4	664·9	34·1	30·9
,,	21·40	751·9	681·7	35·1	31·9
,,	21·12	729·0	658·8	34·5	31·2
,,	20·96	738·9	665·8	35·2	31·8
,,	20·54	732·6	662·6	35·7	32·3
,,	20·50	724·9	654·4	35·4	31·9
Selected Arley coal	20·12	697·0	631·3	34·6	31·4
Works make	19·73	699·8	632·0	35·5	32·0
,,	19·60	674·0	607·6	34·4	31·0
Selected Arley coal	19·45	678·6	613·3	34·9	31·5
,, ,, ,,	19·44	674·8	611·7	34·7	31·5
Works make	19·40	666·6	601·3	34·4	31·0
Selected Arley coal	18·62	659·6	595·6	35·4	32·0
,, ,, ,,	18·09	643·7	581·3	35·6	32·1
,, ,, ,,	17·92	634·0	570·0	35·4	31·8
Staffordshire washed nuts	17·62	640·0	577·6	36·3	32·8
Selected Arley coal	17·56	640·3	577·5	36·5	32·9
,, ,, ,,	17·39	645·7	582·1	37·1	33·5
,, ,, ,,	17·32	631·5	569·1	36·5	32·9
Staffordshire washed nuts	17·26	638·6	575·8	37·0	33·4
,, ,, ,,	17·11	639·2	577·5	37·3	33·7
Arley through and through	16·85	631·0	568·6	37·4	33·7
,, ,, ,,	16·82	629·1	568·4	37·4	33·8
Selected Arley coal	16·73	622·1	560·4	37·2	33·5
,, ,, ,,	16·66	629·9	570·4	37·8	34·2
Staffordshire washed nuts	16·38	626·4	567·4	38·2	34·6
,, ,, ,,	16·01	617·6	556·9	38·6	34·8
Selected Arley coal	15·49	609·2	549·0	39·3	35·4
Staffordshire washed nuts	15·20	597·3	540·2	39·3	35·5
Selected Arley coal	14·67	609·1	550·8	41·5	37·5
,, ,, ,,	13·66	589·3	531·7	43·1	38·9
,, ,, ,,	13·40	576·9	521·4	43·1	38·9
Staffordshire washed nuts	13·07	567·9	515·5	43·5	39·4

Effect of Diluting Coal Gas with Uncarburetted Water Gas.

Percentages.	Illuminating Power.	Calorific Power.		B.T.U.'s per Candle.	
		Gross.	Net.	Gross.	Net.
	Candles.	B.T.U.	B.T.U.	B.T.U.	B.T.U.
100 coal gas	19·29	674·5	606·2	35·0	31·4
90 ,, and 10 water gas	18·45	646·0	581·0	35·0	31·5
80 ,, ,, 20 ,,	16·67	615·8	555·6	36·9	33·3
70 ,, ,, 30 ,,	14·26	585·1	528·9	41·0	37·1
60 ,, ,, 40 ,,	11·89	544·1	495·1	45·8	41·6
50 ,, ,, 50 ,,	9·88	515·8	468·4	52·2	47·4
40 ,, ,, 60 ,,	5·08	469·0	427·1	91·8	83·5
30 ,, ,, 70 ,,	under 1·0	436·8	399·4	..	..
20 ,, ,, 80 ,,	..	404·5	370·7	..	..
10 ,, ,, 90 ,,	..	372·2	342·0	..	..
100 ,,	..	333·0	306·8	..	..

Summary of Consecutive Calorific Power Tests on Works Make and Stored Gas.

	Works Make.	Stored Gas.
Average of all the tests	703·9 B.T.U.	674·5 B.T.U.
Maximum test	732·3 ,,	683·5 ,,
Difference between maximum and average	28·4 ,,	9·0 ,,
Percentage difference between maximum and average	4·3 per cent.	1·3 per cent.
Minimum test	660·5 B.T.U.	664·3 B.T.U.
Difference between minimum and average	43·4 ,,	10·2 ,,
Percentage difference between minimum and average	6·2 per cent.	1·5 per cent.
Difference between maximum and minimum	71·8 B.T.U.	19·2 B.T.U.
Equivalent difference between maximum and minimum	2·0 candles	0·5 candle
Greatest difference between consecutive tests	21·6 B.T.U.	15·3 B.T.U.

Mond Gas.

We cannot close our eyes to the fact that we may yet have another competitor in the field of our industry. In a

paper which I read before this Institute in 1899, I briefly described the plant invented by Dr. Mond for the production of fuel and power gas, and of which we hear so much at the present time. The primary object of the inventor is to produce large volumes of gas cheaply; at the same time recovering the ammonia generated in the process as a secondary consideration. As the lawyers say, the case is *sub judice*; therefore, I will only venture one or two remarks. The composition of this gas is as follows:—

Hydrogen	24·8 per cent.
Marsh gas	2·3 ,, ,,
Carbon monoxide	13·2 ,, ,,
Carbonic acid	12·9 ,, ,,
Nitrogen	46·8 ,, ,,
	100·0

Total combustible gases, 40·3 per cent.; calorific value, 154·6 B.T.U. per cubic foot.

For the purpose of comparison, I give the composition of Dowson gas:—

Hydrogen	19·8 per cent.
Marsh gas	1·3 ,, ,,
Carbon monoxide	23·8 ,, ,,
Carbonic acid	6·3 ,, ,,
Nitrogen	48·8 ,, ,,
	100·0

Total combustible gases, 44·9 per cent.; calorific value, 164 B.T.U. per cubic foot.

There is a distinct family likeness in the two gases in total combustibles; and calorifically they also run nearly parallel, although Dowson leads the way. In both cases the composition of the gas consists of nearly 60 per cent. of useless material; and in the event of Mond gas being distributed for manufacturing purposes, it follows that 60 per cent. of the capacity and cost of the main-pipes will return no revenue. It is also probable if powers are granted to the Company to distribute gas over an extended area, that 60 per cent. of useless gasholder room will be necessary, in order to maintain a steady supply.

According to present ideas, notwithstanding high pressures in mains, an ample supply of gas can only be available by keeping these mains under pressure at all times and under all the varied conditions of demand. This varied demand cannot always be drawn from the generators, as they (like retorts) can only produce a given quantity per hour, and if that quantity is exceeded by the consumer—*i.e.*, if the consumers' demand is beyond the capacity of the generating plant—then failing reserve storage to fill up the deficit, the consumer must suffer. It is also difficult to realize what is to be done with the gas if the generating power exceeds the consumption.

There may be, in great manufacturing centres, a field open for the supply of this fuel gas; but we must not overlook the fact that in water gas we have a cheap power, because it contains 95 per cent. of combustibles, against 40·3 per cent. in Mond gas.

Education.

Much has been written and spoken on this subject of late years—not only within the prescribed lines of our profession, but generally throughout all professions and trades of the country. I may also say that much intellectual progress has been made in all branches of education in late years. Intellectually, morally, and physically, education has undoubtedly made its mark. It now reaches the poorest of the poor; and practically speaking no child, if physically capable, can possibly escape being taught the "Three R's." I am bold enough to say that if a boy has thoroughly acquired these three subjects, he need not look back. He starts life with a very moderate education; but, if he is made of the right stuff, he will make his mark.

It may well be asked, what standard or model are we aiming for? At the root and base of my standard, gentlemen, the home training of the boy rests solid—that is the first and great foundation. From a good mother, a boy will learn that which schools and universities cannot give. His life and being are then modelled; the hall-mark of integrity is stamped upon him, and though young he will never forget the true and simple principles then taught him. But as I have said, that is only the foundation; the superstructure has to follow.

Now, gentlemen, it would be foolish of me to attempt in this address to enter into the forest of argument connected with education. It is a subject that has exercised the minds of our greatest statesmen and our greatest men; and perhaps it was never more seriously considered by the people of this country than at the present time. We have evidence to prove that our industries at home, and our markets abroad, are being outflanked by other nations. Our great over-sea dominions now offer trade facilities which half a century ago were but a dream in comparison. These facilities and advantages are caught up and fostered by the great industrial nations of the East and the West, with the result that the Old Country seems to stagger somewhat under the strain of competition.

If the present system of education is responsible for things as we now find them, then the sooner that system is improved the better for the country. The system which is wanted will probably be inaugurated and carried through by private enterprise; but it is as clear as noon-day that our educational programme at the present time does not afford facilities for the equipment of our men to meet the onslaught made upon us.

The same argument, of course, applies to ourselves—we are "the people that walked in darkness." At the present time, many of our boys are taken from school at the age of 14 to 15 years. I do not doubt that hundreds of thousands of such boys are required in business; and that no better training is necessary for the particular branches of trade they may be engaged in. At the same time, the system cannot be blamed because these boys have been withdrawn from school when only about one-quarter thoroughly trained. If, however, a boy is aiming high, and his parents can afford, and rise to the occasion to meet the expenses incurred in his education over a period (say) up to 19 or 20 years of age, the boy should by that time be fully equipped theoretically, and to a certain extent practically—at least, in chemistry—to enter the lists. If in his training building and mechanical drawing has had a place, he may at once enter the shops, and learn how to handle tools and to practise the art of making, erecting, or repairing machinery, and generally make himself acquainted with detail work, which is of so great importance in the small space of time at his disposal. This, together with the school training on the drawing-board, will prove of admirable service afterwards. Such a boy can now put his foot on the ladder; and if he (quoting a remark of a gentleman eminent in our profession) "is true to his salt," may rise to the highest pinnacle of fame in the gas world.

This rough sketch is, of course, of a private middle-class education, and one which would help a boy over many stiles; but I am constrained to say it is not given in many instances where it could be well afforded. Technical education, carried out in its fullest sense, is admirable; but thorough practical and competent teachers are necessary before that end can be achieved. There ought also to be a greater assimilation of science with practice in our colleges and schools—more especially in regard to the training of an engineer, whatever branch he may be engaged upon. The combination would probably follow, granted that capable professors or masters were found to do the work.

Amalgamation.

As your Council have fully reported to you upon the negotiations carried on with the Institution of Gas Engineers since last June, it is not my intention to add much more. We are, I regret to say, just about as near amalgamation as we were twelve months ago. Much time, and money also, has been spent by your Council in attending meetings during last year, in order to mature, if possible, something tangible for your consideration to-day. There has throughout these negotiations been exhibited the keenest desire by every member of the Council of this Institute to forward, and to bring to a successful issue, that which is paramount in the mind of every gas engineer at the present moment. It is needless to say that desire has not been fulfilled. It seems to be the opinion of some men that the old tree must come under the pruning-hook before a safe graft can be performed.

Now, gentlemen, your Council have never held that opinion at any time. There are, it may be, a few straggling branches, more or less dead, which might be lopped off the old tree, as they are of no use. But they do not endanger the healthy growth of the gas industry tree. Therefore, we have been working on the lines of retaining the membership wholly as it appears on our lists.

Although as a Council we thought, and still think, dissolution and change of name quite unnecessary, it was stated at the meeting of the Joint Councils that, rather than wreck the whole scheme, we were prepared to reconsider these

points, if any strong objection was evinced regarding them; and I trust I am not transgressing when I say that our case relative to these particular points was scarcely put in a fair light in the report made to the Institution of Gas Engineers. Negotiations are still in progress; and perhaps some day amalgamation will be effected.

In conclusion, I unhesitatingly say that the Gas Institute was never in a more sound, stable, or established condition than it is to-day; and it contains all the grit and ability necessary to do much more than has ever yet been done to advance the industry we have so much at heart.

Now, gentlemen, I thank you for your patience and attention, and apologize for offering such a disconnected and uninteresting address. Many important and interesting subjects have been left untouched; but these will likely be more ably dealt with by individual members in the form of papers, &c., yet to come.

A New Arrangement of Purifiers.—We learn that Messrs. C. & W. Walker, Limited, will shortly bring under the notice of gas engineers an arrangement of purifiers which will show great alterations and improvements in working, and at the same time effect considerable economy in construction. All outside valves will be dispensed with, thereby reducing by one-half the cost of connections; while the time now employed in removing and fixing the covers will be greatly shortened, and the operation of the purifiers generally facilitated. The arrangement has been patented.

Chemistry of Carbon.—In his concluding lecture on this subject at the Royal Institution last Thursday, Professor Dewar dwelt more particularly with the assimilation of carbon by plant life. After discussing the properties of marsh gas, he showed how acetylene is directly formed when a current of hydrogen is passed through a carbon tube heated by the electric arc to a temperature approaching 3500°. Another synthesis, which gave an idea of how complex bodies could be built up from simple ones, was that of hydrocyanic acid, which was formed when nitrogen was passed through the tube together with the hydrogen in the previous experiment. This under the action of water yielded formic acid—the first fatty acid—and ammonia; and the latter, like nitric acid, could be utilized by plants, which, however, could not employ elementary nitrogen. The lecturer next explained how three molecules of acetylene combine together to form benzol. In conclusion, he remarked that, though the chemist could illustrate in his laboratory some of the operations which take place in the leaf of a plant, he must admit that what he did could not represent them in a true sense.

Effect of Scale on Boiler Efficiency.—In the concluding paragraphs of an article in "The Boiler Maker," on "The Effect of Scale on Boiler Efficiency and Capacity," Mr. William H. Bryan, of St. Louis, says: "(1) Ordinary boiler scales, which are usually more or less porous, have little or no effect on either the capacity or the efficiency of a boiler until the deposits become so great as to impede circulation; (2) the hard and dense scales sometimes met with will reduce both efficiency and capacity, but to an indeterminate extent, depending upon the quality and thickness; (3) the presence of even a small quantity of soot on the fire side of heating surfaces has an immediate and marked determined effect on both capacity and efficiency. This latter point has been frequently demonstrated, but nowhere more clearly than in a series of evaporative trials which I made on some water-tube boilers at Columbus, Ohio, some few years ago. Three boilers, identically alike, were under trial; being operated together as a battery. The temperature of the escaping gases from two of these boilers averaged 498°, while those from the third (much to my surprise) averaged 628°. After considerable investigation, I discovered that, in the hurry of preparing for the trials, the workmen had neglected to clean the soot from the external surfaces of the third boiler."

Acetylene Superior to Electricity for Lighthouse Illumination.—It is reported by the "Engineer" that during the months of April and May, 1899, some experiments were tried as to the value of acetylene in a small light of the sixth order at one of the batteries guarding the entrance to the harbour at Genoa. These having proved very satisfactory, the Italian Minister of Marine suggested that the inventor of the apparatus should repeat them on a larger scale at the first-rate light of "La Lanterna," the principal light of Genoa harbour. The test was to be carried out at the inventor's own expense; and he had to guarantee better illumination than that given by the petroleum burners of the lighthouse, and a constant light without smoke or interruption for fifteen hours at a time. The offer was accepted; and an apparatus with four separate generators was installed. For a period of 1000 hours, or 100 days of ten hours each, during October to January of last winter, the lighthouse was worked with the new gas without the slightest difficulty. At a distance of 40 nautical miles from Genoa is the electrical light of Tino; and it was observed that, while the Tino light could never be seen at Genoa, the Genoa acetylene light was visible at Tino. It is also stated that the annual cost of maintaining the electrical installation at Tino is 26,000 frs.; whereas, from the experience gained at Genoa, it could evidently be supplied with acetylene for 1200 frs. per annum.

ESSAYS AND REVIEWS.

COKE-OVEN VERSUS GAS-WORKS COAL CARBONIZING PLANT.

All competent readers of the signs of the times in respect of the technicalities of town's gas production must agree that the best and most advanced professional opinion is at the moment in a state of suspense, on the question of what is to be the line of development of gas manufacture in the immediate future. Although the practical man of affairs is reasonably apt to experience a feeling of impatience in the face of the common kind of vague talk about what is to be the future form of his own business, or that of any of his rivals in trade, and thereupon to mutter something about the paramount obligation to have regard to the things of the present, in the gas industry it is impossible to deny the imminence of changed conditions of trading, which must naturally have some—as yet unknown—effect upon the methods of manufacture. One of these significant changes has already begun, and has gone some way; and when the Welsbach patent of 1893 expires, six years hence, the alteration will have extended to lengths which cannot now be foreseen. Coming events cast their shadows before. It is not to be supposed that the change now in question will wait all these years without projecting its influence far and wide by anticipation. Indeed, the probability is that 1907 will be a date rather than an epoch in the history of gas consumption; but we lay stress upon the chronology merely in order to remind those whose business it is to manufacture town's gas, of the extent of the limit of time that actually remains for them in which to adjust their methods to the inevitable change of exterior circumstances.

Once more, the necessary process of internal adjustment of the statutory gas industry of the United Kingdom has been inaugurated by the tentative reduction of the legal illuminating power of gas in London and Glasgow, and a few other places, as to which our readers are sufficiently informed. As technicians, they are also well aware that the price paid by the South Metropolitan Company for this first measure of deliverance from an obsolescent system, is at least as great as the boon is worth under present conditions. That is to say, if the extent of the gain of the gas manufacturer is limited to the saving of the actual book-cost of enriching his gas from the normal quality yielded by the staple of the raw material he has been in the habit of buying, to the old legal standard, which was only two or three candles higher, this does not amount to much. In the case just mentioned; it has been dearly purchased. But it is neither the belief nor the intention of the manufacturer that this saving shall be the whole of the gain. He expects to make a good deal more of it, in a variety of ways, including a considerable alteration in methods of manufacture.

The nature and extent of this expected alteration are unknown. It is upon this point that technical judgment remains for the time being in suspense. It is scarcely too much to say that even the boldest spirits among the would-be innovators are waiting for things to shape themselves a little before giving any particular development a push. In this connection, certainly, those upon whom rests the responsibility for making a move realize the justice of the old saying about the wisdom of "making haste slowly, in order to finish the quicker." Both theory and practice are "marking time" in this respect. Dr. Bunte has suggested that a first step in the direction of cheapened gas production might well consist in the addition of 20 per cent. of plain, uncarburetted water gas to the gas resulting from the destructive distillation of coal in closed retorts. This prescription might be made up in a variety of ways. There are at least three different systems of making the water gas, to be compared in ordinary working in different localities. This wealth of choice in regard to water-gas systems is a great advantage to the gas maker, who can feel assured that up to the present time the technic of water-gas manufacture is more settled and defined than is that of coal carbonization.

As regards the latter technic, it is necessary to clarify one's ideas of what actually can be assumed as possible data, what is commonly achieved, and where openings for improvement lie—whether within or outside the ordinary practice. We know, to begin with, that the physical balance-sheet of a well-managed coal carbonizing plant of the usual type is exceedingly creditable. For every ton of coal put into the retorts, there is not more than 1½ per cent. by weight of matter unaccounted for. This is a physical efficiency for the plant of 98½ per cent.—a result of which the most highly "scientific" conversion plant or machinery in existence need not be ashamed. And when it is remembered that the process of converting a ton of coal into the products dealt in by the gas manufacturer is not a continuous one—that the ton of coal has to be operated upon in six or seven doses—it becomes evident that the amount of avoidable waste of material every time must be insignificant.

Next, as to the capital cost of the plant that already effects this conversion. We can satisfy ourselves upon this point, with reference to every element that enters into the account—land, structural materials, labour; and we can ascertain the precise range of possible economies due to arrangement of the retorts in settings

by number, and so forth. It is the same with the working costs. These can be connected directly with the previous computation, by engineers who know how to spend money in order to save it. And so, by a simple process, every competent gas engineer is able to frame his own estimates of carbonizing costs and expenses. This is his ideal of what is possible. Some engineers may be so situated as to be in a fair way of realizing their ideal, as when the undertaking is growing fast and there are no drawbacks of position, want of funds, labour troubles, and such like. Others are fain to put up with a discount on the ultimate possibility, which may or may not apply equally to all available alternatives.

Assuming all the necessary data of structural costs and working expenses to be known to the carbonizer by ordinary methods, and assuming further that he is knowingly obtaining the highest physical return from his plant and system of working, he has next to satisfy himself that this physical efficiency corresponds as fully as possible with the best industrial and commercial results. It would be foolish, for example, to plume oneself upon getting an extra pound or two of products out of a ton of coal, at an inordinate expense for supervision, cleaning, maintenance, or any other charge. Thus, in the gas industry there is a size of works and scale of operations, which produce the best industrial results. They are neither the smallest nor the largest. But their superexcellence is a peculiar attribute of their dimensions, and cannot be compassed by any effort of human will where the essential conditions do not exist. The same may be said of those sometimes striking economies which the large scale of the operations of a few gas undertakings render possible. Take, for example, a big works which sells the dust of its furnace flues for a substantial sum per annum. The illustration is purposely made an imaginary one, to avoid all imputations of "pointing a moral." Is such an economy as this, which is precisely of the kind that catches the fancy of the populace and gets into "popular" lectures and newspaper articles, all profit? By no means. Works where such savings are quite possible, may be wasting at the bung far more than the most alert husbandry can possibly save at the spigot: and, unfortunately, such waste is usually organic, constitutional, and beyond the control even of those who are fully conscious of what is going on.

Then, as to the commercial result. Supposing that the physical duty of the plant is irreproachable, and the industrial character of the system as perfect as it can be made, are the products quite the most profitable that might be hoped for? Would it be possible, for instance, to get a little more of the most desirable product at the expense of another that fetches less money? This is the prime question of internal economy. It naturally leads up to the next query—is there any better way of treating the raw material to get a preferable result? Here, at last, we are brought face to face with the problem of the day in gas engineering. It must be attacked by the way along which we have come—the path through and from the known, to the unknown.

At the present time, there is only one method of coal carbonization, different from that practised in gas-works and offering unfamiliar attractions to the gas engineer. This is the coke-oven system, in its modern guise, as realized in a special fashion at the Everett (Boston) works described in the "JOURNAL" during March last.* Readers of this description are not likely to overlook the "head-and-horns" style in which this particular enterprise has been dragged into the gas industry of a locality which, to put it mildly, was not looking for such competition, or assistance, or whatever may be the commercial character of the venture. It was the work of one speculator; and whether it stands or falls it will not affect the future of the principles of gas manufacture which it embodies and which it pretends to supersede. Upon this point, it is profitable to listen to the reasoned opinions of Mr. Frederic Egner, which have been communicated to the "American Gaslight Journal," and were published in the issue of our contemporary for April 22.

Mr. Egner starts by admitting as proven that the bye-product coke-oven is "a long way ahead" of older methods of coke manufacture; but this is precisely what the largest manufacturers of metallurgical coke in the United States, in the far-famed Connellsville region, do not concede. Neither is it admitted in the North of England. It is held by metallurgists, on the contrary, that the best furnace coke, *quâ* coke, is the product of the beehive oven; and they will never buy anything else, for the best blast-furnace work, so long as they can get it. This is not to say, of course, that there is not plenty of use for the bye-product recovery coke-oven in its place and way; but it is as well to remember that an "improved" coke-oven is not the proper designation for it, in the judgment of those who are best qualified to speak on the subject. Apart from this reservation, it should not be open to dispute that the Everett works, near Boston, are a model of their kind. Hence it cannot be wrong to take them as representing the best that can be done in this way for comparison with modern coal-gas works. The main difference between the two constructions of coal carbonizing plant, as Mr. Egner acutely points out, is that in the one the retort-bench contains a few large retorts, while in the other it contains a large number of small retorts.

At Everett and similar establishments, the retort-benches stand in the open, which is a saving of capital outlay *ad hoc*, but with no particular justification. A retort-house is no more necessary in a gas-works than at a coke-works; but it is equally desirable in either case. Consequently, the cost of housing can be eliminated from the comparison of capital outlay. But it is another story in regard to the area of ground space required per 1000 cubic feet of gas made for sale in 24 hours. Mr. Egner states that carbonizing plant such as that at Everett requires 25 square feet of land per 1000 cubic feet of daily output, as compared with 6 square feet for the same unit of production in a modern gas-works. This is a question of the cost of the land required; but of more universal moment is the complementary statement that "the area of equally costly brickwork is about two-and-a-half times greater with the bye-product coke-ovens than with the coal-gas works" for the same output. This is a very serious consideration.

The remainder of the gas-works plant will be the same for all systems of carbonization. At Everett and similar establishments which are coke manufacturing plants first and gas-works afterwards, the retorts are heated by burning part of the gas made. This would not be the practice in an ordinary gas-works, where the gas is the more valuable product. In any case, however, Mr. Egner says that coke-oven plant for carbonizing coal costs more, not less, than ordinary gas-works plant. Then, as to working expenses, he maintains that with inclined retorts and modern coal and coke handling plant there is no reason why the gas-works should not even beat the coke-oven plant. On the whole, therefore, Mr. Egner fails to see why the latter should be preferred to the former, unless: (1) There is a good market for the metallurgical coke, and (2) for the slightly larger quantity of ammonia and tar yielded by the retort-oven at the expense of the gas. Thus the commercial question is set. The answer will be awaited with interest.

* *Ante*, pp. 616, 679, 749, 820.

A SUPPOSED NEW DANGER IN GAS-WORKS.

A CHEMIST'S WARNING.

THE London Section of the Society of Chemical Industry spent a very unprofitable half-hour or so on Monday evening last week in listening to a paper by Mr. G. Cecil Jones, of the Basingstoke Iron-Works. It was entitled "The Need of Greater Care in Introducing Gas-Firing into Small Gas-Works." The title of the piece gave promise of something interesting; the performance was distinctly disappointing. In the first place, the composition was unsuited to the audience; in the second, it was patent from Mr. Jones's method of treatment that he was not altogether qualified to deal with the subject; and in the third, he had no proof that the fatality on which he based his plea and warning was really due to the cause ascribed.

In a little prelude, Mr. Jones stated that he had cut the paper down to the narrowest possible limits; and we have no hesitation in believing that, for this act of kindness, his audience, after hearing his story, were truly thankful. So that Mr. Jones must, or may, feel pleased that his contribution in at least one respect met the views of those who heard it. But the reason he gave for curtailing it was that he wanted gas engineers to read it. Now we can assure Mr. Jones that, whenever he has anything worth putting before the gas profession, no matter to whatever length it may run, it will receive their attentive and respectful consideration. If, however, he is again possessed by a great yearning to educate gas engineers, or to call attention to some flaw in their practice, he will, if he chooses to inquire, find there are special societies in existence at whose meetings such papers may be read, and where they will be adequately discussed, instead of being, as was this one on Monday night of last week, dismissed without a word of comment, for the simple reason that there were only one or two chemists present who were competent, had they felt sufficiently interested, to say anything on the subject. Beyond this—and Mr. Jones may not be aware of the fact—the Society of Chemical Industry are jealous of their rights in the publication of their proceedings; and had the paper been one of great importance, the very people whom he wished to reach, would only have had the paper presented to them in shortened form. As it happens, our notes on this occasion more than suffice to carry his message to the gas profession; but he and others will do well to bear the point in mind.

After the preface to which we have been referring, the learned chemists present were treated by Mr. Jones to an elementary explanation of the old direct method of heating retorts in gas-works; and then, in leading up to the main part of his paper, he told them how for years past in large works direct-firing has been abandoned in favour of gaseous firing. In expounding the principles of this system, he made this remark: "By a complicated arrangement of flues and air passages, the hot gases leaving the setting are made to give up a portion of their heat to the secondary air on the way to the combustion chamber. Where this is done, the arrangement is inaptly termed regeneration." He then went on to say—and very truly—that gas-firing generally, whether regenerative or not, "has, it is claimed, many advantages, and all those claims may be included in the expression 'increased economy.' It may be of fuel, labour, ground space, wear and tear of retorts, or what-not." Here, if crudely expressed, Mr. Jones shows he appreciates—partially it may be—the very good reasons which have influenced the adoption of this system of firing. With very few more words, he dropped into the pith of his paper. This gaseous firing, he informed the uninstructed in his audience, has been gradually introduced into smaller and smaller works. Its adoption in works other than those of large size, however, was, he remarked, very gradual until two years ago, when an account of

the results attending its employment on a works with an output of 30 million cubic feet of gas per annum was considered of sufficient interest to form the subject of a communication to the Incorporated Gas Institute. In the discussion, two members spoke of the successful adoption of regenerative settings in very small works indeed—works of annual outputs of only 3 or 4 million cubic feet. Such experience as that, in the absence of contradictory evidence, said Mr. Jones, must lead to the adoption of such settings in the smallest works. He has had occasion, he went on to tell his audience, to recently inquire into the circumstances attending an accident in a small works of about 3½ million cubic feet capacity; and what he saw there has led him to the conclusion (which he holds very strongly) that special precautions must be taken in future if gaseous firing is to be introduced into works so small as these.

In the case to which Mr. Jones referred, the retort-house is only about 16 feet from the floor to the eaves; and the measurement from the front of the stack to the outside wall is 12 feet. We agree with Mr. Jones that these are very inadequate dimensions for any retort-house. Now the mouthpieces and "columns" (of course, the author meant the ascension-pipes) extended 2 feet beyond the bench, leaving only a 10 feet space in front of the retorts, part of which is at times occupied by coal and coke. The place was (if it is not now) also ill-ventilated. Ample outlets are provided in the upper part of the roof, for the escape of the hot air and gases—there being an open space of 18 inches running the full length of the building. But where the ventilation failed was in the fact that there was no provision for the admission of cold air, excepting such as found its way under a couple of doors when the openings were not blocked by coal or coke. Two years ago the house contained three small settings of one, two, and three retorts, with direct firing. The two smaller settings were then replaced by a regenerative setting of five retorts. Regeneration, remarked Mr. Jones, is not carried to any great extent; and the generator itself is only about 3 ft. 6 in. deep. Fuel is added to the generator every three hours by hand. The works are in charge of an especially intelligent working foreman, who does the work alone in the summer, but in the winter is assisted by a man who does the night work. Now neither man before the accident had been informed, or in any way knew, that the carbonic oxide generated in the new setting was more dangerous than the simple flue gases from an ordinary fire, as in the old settings.

Proceeding, Mr. Jones came to date and hours and the tragic part of his narrative. At seven o'clock one morning in November last, the man who did the night work was found dead in the retort-house. The condition and height of the fire told the foreman quite clearly that it had been attended to at 4.30 a.m. The coke should have been drawn from the retorts, and these recharged, at five o'clock; but this had not been done. One of the man's last acts had thus been to charge the generator. His appearance was consistent with poisoning by carbon monoxide. The Coroner unfortunately allowed the Jury to return a verdict of misadventure, without a *post-mortem* examination; and because of this, Mr. Jones admitted, there was just a doubt that death may have been due to some other cause than carbonic oxide poisoning. For this reason, the widow, in the action she brought, under the Workmen's Compensation Act, lost the day. Had she succeeded, said the author, the facts and circumstances of the accident would doubtless have been widely reported.

All this shows a deal of assumption on the part of the author in regard to the main fact upon which he hung his case, and which enabled him to give it just that turn which afforded a slender justification for the reading of the paper at a meeting of chemists. However, he pursued his argument by saying that, even if it could be proved that the man's death was due to some other cause than poisoning by carbonic oxide, he should still hold, in the light of what he saw, that special precautions are necessary if gaseous firing is to be introduced into works so small as those in question. No blame, he confessed, could be attached to any individual in this case. He thinks it was assumed—very naturally, but wrongly as the event proved—that what was safe in a large works would be safe in small ones. But with the decrease in the size of the plant, the conditions that determine safety or otherwise change altogether. To begin with, he observed, the cubical space in the retort-house is, of course, smaller than in a large works; and the design is left to some incompetent person, with the consequence that less consideration is paid to ventilation than would be the case if a respectable architect were employed. In the second place, in large works, the generators are much deeper—perhaps 7 or 8 feet deep; and it is not necessary to fire more often than perhaps once in five or six hours. Then again, in large works some sort of shoot is provided, by which the hot coke from one or more retorts in a setting is conveyed direct from the mouth of a retort to the generator; and the workman has no occasion to be near the mouth of the generator, which during the short time it is uncovered is completely blocked by the inrushing stream of hot coke. On the other hand, in small works shallow generators are employed; and, in the case to which he had referred, though the retorts are only charged once every six hours or so, the generator has to be charged once every three hours, and the man stands with his face over the opening. There is no necessity for the man to stand with his face over the opening; and this, and the form and substance of the preceding statements, reveal Mr. Jones's superficial acquaintance with his subject. The next point (and to this the author attached great importance) is that in a large works a workman is probably never left alone. He always has someone with him, who in the event of accident could carry him into the open air or render other assistance.

Mr. Jones therefore deprecated one-man shifts in small works; and he told his hearers (as though he did not know it was already done) that it would be a simple thing to provide ample inlets for the admission of cold air, and not a difficult thing to design some means of preventing the workman inhaling carbonic oxide when he is putting fuel into the generator. In other industries, he pointed out, where carbonic oxide generators are employed, a proper valved hopper with cover is used, so that, when fuel is added, it is impossible for gas to escape. Then, in the same breath, he admitted that the importance of good ventilation has been insisted on by gas engineers, for the reason that, where it is not provided, there are choked ascension-pipes. But, said Mr. Jones, with due gravity, "it must be done for the sake of the workmen." Surely it should be unnecessary to remind such an instructor as Mr. Jones, that the ventilation that is good for the one purpose is good for the other. No one, however, will dispute the statement that any system of ventilation which fails to provide air-inlets, as well as vents, is no ventilation at all. But we do emphatically protest against the insinuated want of knowledge and caution contained in the following sentences with which Mr. Jones brought his communication to a close: "The adoption of gaseous firing has been solely from the point of view of economy; but I do not think gas engineers will be sorry to have early warning of dangers in gaseous firing, so that they may make adequate provision. Where such a generator as this is put in an entirely unventilated building, or is put in charge of a workman without warning him that the conditions of his employment are dangerous, then I say—and I say it pretty strongly—that the conduct of an engineer responsible for such an arrangement must be (using a term employed by Professor Armstrong on another occasion) described as highly immoral."

Now the whole paper (or rather communication, for the author did not confine himself to his manuscript) proves to us conclusively that Mr. Jones does not know the gas-works of this country nor the gas engineers as we know them. We venture to think that 99 per cent. of the gas engineers of this country who have adopted gaseous firing could tell Mr. Jones and the bulk of the members of the Society of Chemical Industry more about the actions—chemical and otherwise—which occur in their generators than those gentlemen know at present. The retort-houses of 99 per cent. of our gas engineers prove that they are fully alive to all Mr. Jones has said on the subject of ventilation; and the immunity from accident which retort-houses enjoy (compared with works where chemical operations are conducted) is a sufficient answer to Mr. Jones's warning and advice, and testifies to the care which is taken in respect of the safety of the workmen. In the saying of all which, we do not disparage the work which chemists have done, are doing, and we hope will continue to do, for the gas industry. But we do deny the right of any chemist who has obviously little knowledge of the subject taking a small isolated building which any gas engineer would disown as a retort-house, and an incident the cause of which has never been proved, and upon such unfair ground and hypothesis to publish to the world, and to gas workers, statements which would lead them to suppose that another danger lurks in the process of gas manufacture the presence of which was not known before. As we have said, the freedom from accident in the retort-houses of the country proves the fallaciousness of Mr. Jones's argument, even applied to small works. Chemists like Mr. Jones had better keep within their own domains, and devote themselves to devising safeguards and improving the conditions of the workers in the varied operations of the chemical industry. They will, we have no fear, find plenty to do. The gas industry have, as is remarked above, much to thank chemists for; and there is much they have done for which no thanks are due.

OLD-AGE PENSIONS AGAIN.

The question of old-age pensions had fallen far into the background in consequence of the occurrence of war in South Africa—with its absorption of public interest and public funds—until it was again brought prominently to notice by Mr. Chamberlain in the course of his address to the conference of the National Independent Order of Oddfellows at Birmingham, a brief reference to which was made in our leader columns last week.

As Mr. Chamberlain said, the subject, which was at one time so freely canvassed and earnestly discussed, has of late gone back rather than forward, so as to be now farther than ever from any practical issue in the direction desired by advocates of State pensions for the aged. He sought, in his address, to put it again upon its legs—suggesting that the slate should be wiped clean of all previous proposals, and a fresh start made in the direction of State assistance to Friendly Societies. Those societies find themselves faced by this difficulty: An increasing number of their members are arriving at the time of life when they are permanently, or frequently, incapacitated from work. The grants of sick pay made to those members have become so constant a drain upon the funds as to be virtually superannuation allow-

ances. The financial position of the societies is thereby becoming damaged, with the result that the younger members are showing a strong disposition to withdraw, while other young men are deterred from joining.

That is undoubtedly a very serious matter for these societies; but we cannot agree with Mr. Chamberlain as to the remedy that should be applied. He suggests that the officials of the Friendly Societies should draw up a scheme for substituting pensions for sick allowances after a certain age, and that such scheme should provide for payment by the State of a certain proportion of the pensions. Naturally enough—seeing that Mr. Chamberlain promised that, in the event of such a scheme being accepted by the Legislature, the State would not interfere with the management of the Societies as a condition of its subsidizing their funds—the suggestion was hailed with enthusiasm by the officials of the Order of Oddfellows. But we much doubt whether that enthusiasm will be shared by many persons outside the ranks of the Friendly Societies. Why should the whole of the community be taxed for the exclusive benefit of institutions the members of which comprise chiefly the best paid of the working classes, and very many others considerably above the status of those classes, as the phrase is generally understood? If the subscriptions required of the members be not adequate to provide the benefits they wish to receive, surely the proper remedy is a small increase in the subscriptions, or a revision of the scale of allowances.

The proposal to subsidize one particular class of provident institutions seems quite indefensible, and to be no solution whatever of the social problem which is in the minds of most people when they come to speak of Old-Age Pensions. That problem, as it presents itself to most people, is how to provide some means of support less harsh and repugnant than the workhouse for the aged worker who has found it impossible, or impracticable, to provide such means of subsistence out of his earnings in earlier years. The subject has been exhaustively examined by expert commissions and committees, which have one and all found insuperable the difficulties lying in the way of any scheme of State pensions. The harm or injustice certain to arise out of every practicable scheme has been found to so far counterbalance its advantages as to place it outside the pale of possibilities.

Obviously, to give assistance to those who have been able to provide for themselves to a certain extent is not to touch the fringe of the question of helping those whom we may call the honourably destitute in their old age, and need not therefore be considered from that point of view. What justification, then, can there be for the proposition to endow thrift as manifested in one particular form only? If Friendly Societies in difficulties are to be assisted by the State, why should not all Insurance Societies receive such assistance, or deposits in the Savings Banks be augmented from the Treasury, or Building Societies be subsidized? In all these institutions are the products of working men's thrift invested. Why should not they share the bounty of the State, if it be deemed wise that such bounty should be showered upon the thrifty? Heartily as we should welcome any feasible proposal for the solution of the problem of the destitute aged which would not create difficulties as great as those it removed—an event as likely as the solution of the problem of the "unemployed"—we cannot see such a solution, or any justice, in the proposed State endowment of Friendly Societies

ELECTRIC LIGHTING MEMORANDA.

The Electrification of the Metropolitan District Line—The Transfer of the Control of the Property—The Nature of the Project—Heads of the Contracts.

THE most interesting piece of news this week concerning matters electrical is the result of the special meeting of the Metropolitan District Railway Company for the consideration of the Company's Bill in Parliament for converting the line to electric traction. This event marks an important stage in the history of English railways. It also possesses several points of peculiar interest. Everybody knows the underground railways of London, and is also cognizant of the fact that these lines, which have now for many years formed a complete Inner Circle with tangential feeders, have failed to please anybody. Reckless administration at one end of the system, and dirt and discomfort at the other, made the undertakings a byword even while necessity compelled the public to use them. Those who wish to think well of English railway directors had better shut their eyes to the fate of the unhappy "Underground." Matters came to a climax with the opening of the new "twopenny tube" lines, which had an immediate effect upon the traffic of the Metropolitan and the District Railways; but especially of the latter. Thereupon the Directors woke up, and asked the proprietors to authorize them to meet the new competition on its own basis, and electrify the line.

For this purpose fresh capital was required; and a financial scheme of an ordinary kind was devised for submission to Parliament. Meanwhile, it began to look as if the existing interests in the property were not disposed to find the money. The debenture holders and the owners of preference stock objected to having any new charge put in front of them; and the ordinary stockholder was shy of electric railways, which he did not understand. At this juncture, a group of American financiers put their fingers into the District pie, and effected an operation which is familiar enough in stories of American financial speculation, although it is strange to us. They bought in the open market so much of the ordinary stock of the railway as would carry with it the control of the property as a whole. Mr. J. S. Forbes, the Chairman of the District Company, gave this account of the situation at the meeting; and it was probably the first time that the official head of an English railway has had to confess that the line was bought up by outsiders with a distinct object in view.

Having thus obtained the control of the railway, in a perfectly legitimate manner, the American group (with whom some well-known Englishmen are prominently connected) proceeded to unfold their plan. They are first and foremost electric railway men, with a confident belief in the power of conversion of the line to electric traction to redeem its failing fortunes. Consequently, they announced themselves to the Directors of the Company as partners in the concern, and declared their intention of finding whatever money might be required to effect the conversion. The new partners called themselves, for the sake of convenience, the Metropolitan District Electric Traction Company—referred to in these proceedings, for shortness, as the Traction Company. The Traction Company proposed an agreement, to form a schedule of the Railway Company's Bill, by which they would be bound to carry out their proposals under a cautionary subscription of a million sterling in sovereigns. The nature of the scheme of electrification is, briefly, as follows: The Traction Company undertake to provide the power generating station under one contract. The work will be let by tender, and the Railway Company are to have a voice in determining what is the cost price. The Company will pay a rent for this part of the job, which is estimated to run into £400,000, calculated at 5 per cent. on the outlay.

The other arrangements are of a different nature. The contract for the electrification and equipment of the line stipulates that the Traction Company are to take over all the capital powers remaining unexercised by the Company. This amounts to £500,000 of ordinary stock, carrying with it the power to create £166,000 of 4 per cent. debenture stock. The ordinary stock is to be taken at the nominal price of 25; the market quotation being about 30. The debenture stock is taken at par. In consideration of this surrender, the Traction Company take upon themselves the obligation of the conversion of the line, which they engage to carry out without any interference with the working. If any further money is required, the Traction Company will find it at the same rate of interest chargeable on the cost of the generating station—namely, 5 per cent. Directly and immediately, therefore, the new partners get very little for the specific sums they will have to lay out for the undertaking. As Mr. Forbes says, what they get is a reasonable rate of interest on the outlay; while their chief prospect must lie in the hope of improvement of the value of their large holding of ordinary stock. This at least shows magnificent confidence in the possibilities of electric traction as applied to the Metropolitan District Railway.

Mr. Forbes further explained where the expected increment of profit is to come from. By the conversion of the line to electric traction more trains will be run, and at a much less average cost per train-mile than at present. The District Company now spend 52 per cent. of their receipts in working expenses; whereas they are told that the line can be worked electrically for 35 per cent. If this is so, the difference would represent a saving of £70,000 a year. There will be an adequate saving to pay expenses, however, if the working expenses are 40 or even 45 per cent., besides the multiplication of the trains. A curious condition of affairs will be exhibited to the wonderment of Londoners whenever this conversion of the District is effected, inasmuch as the other line which goes to complete the Inner Circle will remain unconverted. The Metropolitan line, however, was so modified in the hands of the late Sir E. Watkin that it has less than ever in common with the District. If the conversion of the latter line turns out a success, moreover, it is most unlikely that the progress of the movement will be stayed. The ensuing two years will be an anxious time for the District proprietary.

THE GAS AND WATER STOCK MARKET.

(For Stock and Share List, see p. 1584.)

BUSINESS on the Stock Exchange last week was well below the average. The magnificent weather and the racing at Epsom exercised a strong attraction for many; and the attendance consequently was much reduced. The prevailing tendency was decidedly dull, though it had been fair at the opening. Apprehension, however, was caused by the affray in Tientsin between soldiers of various nationalities, which, it was feared, might lead to complications. Prices for the most part were flat; Consols drooping considerably. The American market was better; the curative influence of time having pretty well smoothed out the difficulties of the recent settlement. The ease in the Money Market became so pronounced that a reduction in the Bank rate was inevitable; and accordingly on Thursday it was moderately lowered to 3½ per cent. from the 4 per cent. rate which had ruled since the 21st of February. Business in the Gas Market showed a great improvement in point of activity over what has been the average for some weeks past; proving once more how this department can take a line of its own, irrespective of what rules in the rest. Movements were very irregular, and each stock seemed

inclined to take a line of its own too. There were a fair number of changes in quotation; and just as many in the upward direction as in the downward. In Gaslight issues, the ordinary opened in better favour, and the quotation gained a point. But after changing hands on Wednesday at 96½, it seemed to lose strength a little, and the closing marks were not so good. A fair amount was done in the preference, but none of the secured issues moved. South Metropolitan was flatter, and, after marking 127¼, dropped sharply to 125, with a reduction of one point off the quotation. One single bargain in Commercial old was all that was marked in the week. On the London Exchange, absolutely nothing was done in the Suburban and Provincial group, though Brentford was put up and Brighton was put down. Locally, however, Bristol advanced a couple of points. In the Continental Companies, there was very little sign of animation; and Imperial was weaker and fell back. Among the remoter Companies, Oriental new was higher, but Buenos Ayres debenture fell. The Water Companies were disposed to be weaker; and Southwark had a considerable fall.

The daily operations were: Gas opened on Monday quiet and firm. Gaslight ordinary rose 1. Tuesday was much more active, but quotations did not move. Wednesday was fairly brisk, but irregular. Brentford new rose 3; but South Metropolitan fell 1, and Buenos Ayres debentures 2. Nothing moved on Thursday. Friday was moderately active. Oriental new rose ½; but Imperial relapsed 3. In Water, Southwark ordinary fell 8, ditto "D" 7, and Kent 2. Saturday was quite quiet. Brighton ordinary receded 2.

NOTES.

A Test for Free Lime in Portland Cement.

It is well known by engineering contractors that the presence of free lime constitutes one of the greatest dangers in regard to the use of portland cement. A quick and handy means of examining cement for free lime has therefore been desired; and a suggestion of this kind, offered to "Engineer" by Mr. J. Patchett, of Birmingham, will attract a degree of notice proportionate to the importance of the subject. His prescription is to take 10 grammes of the cement in question, and empty it into 400 cubic centimetres of water in an ordinary 500 c.c. tubular measure. Cork, or place the palm of the hand over the top of the measure, and shake the mixture well for a couple of minutes. Twist the measure in the fingers, so as to get an equal sediment, and let it settle for two hours. Then add saturated solution of ammonium oxalate, up to the 500 c.c. mark. Immediately a white cloud of lime oxalate will form, which must be given a couple of hours to settle. The thickness of the layer of this settlement above the cement sediment is to be noted by the graduations of the measure. Roughly speaking, the amount of every such division will indicate 1 per cent. of free lime in the cement. This is an approximate proportion, and slightly favours the seller. To cleanse the measure after use, the sediment must be gently broken up with a bent wire, washed out, and any sticking material cleaned off with hydrochloric acid.

Some Useful Works Recipes.

For the following useful works "wrinkles," we are indebted to the "Petroleum Review" and the "Ironmonger." A composition for lining tanks, which resists either nitric or sulphuric acid, is a not too thick paste made with powdered pumice and silicate of potash of 30° B. This also forms an excellent cement for glass. An acid-resisting mixture can be made of powdered asbestos, with half its weight of barytes, wetted with silicate of soda. A mixture of equal weights of gutta-percha and solid paraffin, melted together, resists acids and alkalies of any strength. Wood soaked in melted solid paraffin is proof to cold acids and alkalies. We recently called attention to the little-used properties of paraffin as a coal-gas resisting coating for pipes. A troublesome thing in connection with the fixing of gas-stove pipes, gas-engine exhaust-pipes, and exposed flue-pipes in general, is the finishing of them in a suitable and inoffensive manner. Brunswick or Berlin black finish is worse than useless, as it burns off, with an offensive smell, and leaves a rusty iron surface. It is suggested that common distemper water-colour paints can be successfully used, as they neither burn off nor lose colour to any noteworthy extent. Pleasing light tints can therefore be used, with stencilling at the joints if desired; thus giving a perfectly honest face to the pipe, without smell or other change when the surface is warmed.

Wood Carbonizing in Germany.

A United States consular report narrates that, coincidently with the great development of the retort coke-oven industry in Germany, with recovery of the bye-products of coal distillation, there has been a marked improvement of the appliances and methods of the wood charcoal industry, which has been a feature of German forestry from time immemorial. So far has this been carried, that in treating wood nothing is wasted; even the sawdust and the bark being profitably utilized. The distillation of the wood is conducted in retorts, heated by gas-furnaces; both horizontal and vertical retorts being employed. The resultant gas is mostly used for fuel; but can be carburetted and made use of for lighting the works. Owing to the bulky nature of the raw material, the plant must be erected in the woods or at the saw-mills. The other products of the operation are charcoal, tar, raw wood vinegar, and methyl alcohol. The higher the temperature the more tar and gas, and the less crude acetic acid are produced. The crude acetic acid is usually converted on the spot into acetate of lime, which is a standard article of commerce. Acetone is prepared from it, for use in the manufacture of smokeless gunpowder. The wood alcohol has its own uses; and in Germany a considerable use is now made of it for lighting by the aid of incandescent mantles. It is chiefly in demand, however, as a gum solvent in the manufacture of varnishes.

Inlet Ventilation.

The subject of the ventilation of the large blocks of buildings now being erected in London and many English towns will probably rest during the summer season, only to burst out again when autumnal fires bring back the season of smoky chimneys. Apart altogether from the smoke nuisance, there is the common trouble of down-draught from chimneys, which is just as great in the case of gas-fires. It is the practice to assume that an ordinary fireplace will exhaust from the room at the rate of 15,000 cubic feet per hour; and ordinarily no special provision whatever is made to admit a corresponding inflow of air. In summer time, windows and doors will commonly be opened oftener than they are shut; but it is different in winter, where every cranny that might cause a draught is carefully closed. Then, the chimney draught can only be fed through the loose fitting of sashes and doors. Better inlet ventilation of houses is greatly needed; but unhappily no simple and inexpensive means of providing it is usually available. There are many objections to opening windows in the winter time, or during bad weather; and in any case, when blinds are drawn and shutters closed, this means of admitting air becomes unavailable. How to solve the problem of easy and adequate inlet ventilation is a matter upon which readers of the "JOURNAL" might profitably exercise their ingenuity, with a view to the prevention of gas-fire and geyser fatalities during the coming winter.

Polish Peat Fuel.

The recent exorbitant price of coal has had the usual effect of stimulating interest in the large deposits of inferior fuels which are scattered over most of the European countries that usually import coal for all purposes. Consequently, there has been a revival of the talk about the possible utilization for fuel of the peat bogs, which are usually neglected except for small local purposes. Consul-General Murray reports in regard to Poland that there are in the country 30,000 acres of peat which would be useful if it could be made portable. Various companies have been formed with the object of cutting and treating the peat locally; and the Warsaw-Vienna Railway has used some of it in specially-adapted locomotives. The machinery used for pressing the peat into briquettes is only made in Germany; and the demand for sets of it has been so brisk that there has been great delay in filling orders. The best process for treating the peat is stated to be the invention of M. Galecki, by which 130 cwt. of wet peat is converted per day into 33 cwt. of dry briquettes, at a cost of 10s. 7d. for labour. On a larger scale, the cost of preparation of the peat for market is not expected to exceed 2s. 6d. per ton, and of the prepared fuel about 15s. per ton. As compared with the ordinary coal used by locomotives in the country, about 10 per cent. more of the solidified peat would be required to do an equal amount of work. The economic weakness of most of these peat fuel processes is that they cease to be worth carrying on with coal at normal prices. Then the companies stop working; and the next coal crisis finds the peat bogs in their normal condition of neglect.

A Committee on Uniformity in the Size of Bricks.

It having been considered by a Joint Committee of the Institution of Civil Engineers, and of the Royal Institute of British Architects, that some effort should be made to secure uniformity in the size of bricks, a conference on the subject, including representative brickmakers, was held at the recent Building Trades Exhibition. The Joint Committee had drawn up a scheme of regulations, which proposed to standardize English bricks on the basis of the length of a brick being double the width *plus* the thickness of one vertical joint, and four courses of brickwork with four joints going to a foot. Eight stretchers laid square end and splay end in contact, frog upwards, would measure 72 inches in a straight line; eight headers, side by side, frog upwards, would measure 35 inches. The proposal was that this standard should apply to all bricks. Unexpected differences, however, arose over the details of the standard. Some manufacturers said it was practically impossible to turn out all bricks of the same size. Mr. Holwill strongly advocated the adoption of the simple rule that in the work, as laid, the bricks should run four to the yard and rise four to the foot. This rule vastly simplifies brickwork calculations per foot or yard super. It, of course, includes joints. The matter was very thoroughly discussed between the makers of different kinds of bricks, and it was stated that the dimensions of the finished brick are largely a question of the amount of the firing. Practical bricklayers condemned the use of too large bricks. In the event, a Committee was formed to consider the desirability of making the size of bricks uniform all over the country, leaving it open for the time what that size should be.

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COMMUNICATED ARTICLE.

OPTIMISM AND PESSIMISM AS TANGIBLE BUSINESS FACTORS.

By Norton H. Humphrys, Assoc.M.Inst.C.E., F.C.S.

The paper read by Mr. J. D. Ashworth, under the heading of "The Progressive Age," at the recent meeting of the Institution of Gas Engineers, naturally attracts some attention as bearing the title of a periodical published in New York, and which deals with gas, water, and electricity, in a broad spirit, and generally on the lines of "room enough for all" that have proved a source of some amusement to Mr. Ashworth. The general tone adopted by this gentleman would not find favour with the Editors of the periodical in question; and one is almost led to imagine that a little mild sarcasm is implied by the selection of such a title. The reference to things American brings to mind a communication by Mr. C. R. Faben, of Toledo, at the last meeting of the Ohio Gas Association, entitled "Some Observations, Pessimistic and Otherwise" (*ante*, p. 1227), which may be read with advantage side by side with the utterances of Mr. Ashworth, as a wholesome mental corrective.

Mr. Faben impresses upon his hearers that optimism and pessimism are something more than mere speculations of philosophers on morals. They are actual business quantities; because, to a certain extent, the public accept a man and the commodity that he sells at his own estimation. If he has a real personal faith in the value of the article, he succeeds in imbuing a number of his fellows with the same idea. The converse is also true; and the man who takes a gloomy view of future prospects, in his turn carries a certain amount of conviction to those with whom he comes in contact. For this reason, some of the expressions used by Mr. Ashworth are to be deprecated, as they do not represent the general experience, and yet may be eagerly pounced upon and quoted as coming under that heading—and that to the disadvantage of our industry. It is unfortunate that such expressions as "stagnant condition," or "downward grade," should be put forth with some degree of authority. There is no wish to hold up as a pattern the only too common practice of putting forward highly-coloured claims to success, as a help toward securing the ear of the public, or to detract in any degree from the credit due to a straightforward determination to tell the truth without regard to consequences. But with the statements as to the growth of our industry appearing in the Presidential Address which preceded the reading of Mr. Ashworth's paper, and in the paper read by Mr. H. E. Jones before the Institution of Civil Engineers a few weeks since, it is scarcely possible to avoid the conclusion that the unfortunate state of affairs indicated by Mr. Ashworth had reference to a few undertakings only, and is explainable by some special circumstances brought about by misfortune or mismanagement. Mr. Faben's example of an unpopular gas company, under non-technical and indifferent management, is instructive in this connection.

Perhaps the particular point in view was not the gas business as a whole, but in regard to one department only—such as the use of gas as an illuminating agent. It is quite possible to figure too much upon totals, to the exclusion of details. A dose of medicine may be prepared by a skilful physician in such a manner as to be almost tasteless, and yet it may contain a particularly bitter or noxious drug. Something can be used to mask or disguise the objectionable substance. In a similar manner, an apparently satisfactory total may possibly include some unpleasant details. The purposes for which gas is used may be divided under four heads—lighting, cooking, warming, and special technical applications. A gas undertaking may go steadily on, for ten years or more, showing a regular 5 per cent. increase each year. But it does not follow that there is an even 5 per cent. advance all along the line. The character of the business done will have changed in several respects, and one wants to be assured that the changes are not for the worse, and especially whether they are of the nature of straws before the wind, indicating more important changes that may be anticipated in the immediate future. Some of these—such as the increase or decrease of population, advance or decline in the general state of trade, variation in the trend of ideas as to what constitutes a really sufficient supply of light—are beyond the control of the management. Others are the result of enterprise and experience, and are directed towards encouraging and stimulating the consumption of gas—for instance, reductions in price, or improvement in the quality of the article supplied or in the nature of the service. At the commencement of the period, the management may have occupied the stagnant position, taking no interest in increasing the demand, or in the state of affairs on the other side of the meter. But at the conclusion a very different state of things may prevail. The company may be letting stoves on hire, maintaining incandescent burners, providing slot meters with installations of fittings free of first cost, running a town office and show-room, and even canvassing for new business.

Not only is it interesting to endeavour to define how much of the increase is due to chance and how much to skill, but the same kind of investigation may be applied to each detail. Taking the example above cited, in accordance with the usual practice, the chairman probably refers at each annual meeting to the "steady increase in our business," and some shareholder mentions the "very efficient manner in which our affairs are conducted." But a more searching critic may go closely into things, and bring out the actual state of affairs under each heading, as follows: Lighting, decrease 10 per cent.; cooking, increase 55 per cent.; warming, increase 5 per cent.; technical purposes, *nil*. He may further point out that the increase under the second heading is largely accounted for by the practice of letting stoves on hire, and demand to know why all the eggs have been put into the cooking department basket—proceeding to quote chapter and verse to show that the other departments might also have been increased, perhaps between them to the extent of 75 per cent., which would give an aggregate advance of 125 per cent., instead of 50. The manager is questioned as to the correctness or otherwise of such a statement, and replies to the effect that he was only authorized to deal with the stoves, but that if he had been allowed the same liberty with regard to heating and lighting appliances something approximating to the larger increase might have been obtained. Probably Mr. Ashworth's criticism may apply to more than one department. And if his paper does no more than illustrate that something more is called for than keeping up a steady increase, as may readily be done by rushing one thing only—usually cooking stoves or slot meters—for all that it is worth, to the exclusion of other departments which are left uncared for, he will have conferred no small benefit on the gas industry.

The above example is simply a means of illustration, and not an indication of actual fact; and there is nothing to show that during the last ten years any one department has suffered an actual decrease. The Welsbach burner, using $3\frac{1}{2}$ cubic feet per hour, may replace two or three 5-feet flat-flames. But in many instances they have superseded something else besides gas, and in most cases the evening consumption of 1901 will compare very favourably with that of 1891. But it is purposely selected as a specimen of the conclusion that might be arrived at by a shrewd outside observer. If he forms the impression that good-class gas lighting is scarcely worth having, the companies have only themselves to thank. For is it not a fact that many of them let the principal streets go, without an attempt to retain them; while at the same time they are actively bidding, in the small bye-streets, for 20,000 cubic feet per annum consumers involving an outlay of £7 to £10 each? A fraction of such amount, expended on intelligent inspection, on maintenance, and on hire or hire-purchase systems, would serve to keep a hold on good-class lighting business. It is usually much easier—and certainly as remunerative—to hold a sale of (say) 10 million cubic feet per annum, already in hand, than to develop an entirely new and additional demand for a similar quantity.

A certain amount of pessimism is always evident in gas circles, but rarely in the technical department. The Ohio gas engineers agreed in condemning it; and any body of gas managers in this country would arrive at a similar verdict. It is usually the non-technical person, interested as a large shareholder, or perhaps as a director, who is burdened with a sense of the responsibility connected with the raising of so much capital, and who quickly catches up any utterances of this character that come from a reliable technical authority, and uses them as a convenient handle for enforcing a cautious policy when extensions are under consideration. No matter in what direction it is proposed to extend—new retorts, new holders, larger mains, or apparatus on hire—he is apt to urge a narrow-minded, cautious sort of policy, instead of that broad-minded, but competent, survey of the whole subject which clearly perceives when the opportunity for bold enterprise offers. There is one distinctive feature about the over-cautious shareholder; that is the smallness of his own gas bill. He does not rank in the class described by Mr. Faben, who have a strong personal faith in the value of their commodity; because the best evidence of such faith is to be found in a liberal personal use of the same. One often laughs at the story of the bald-headed chemist who sells an infallible hair restorer; but the man who essays to set forth the advantages of gas, and uses nothing beyond three or four flat-flame burners in his own house, is of the same kidney. One may say that the pessimist in regard to the future of gas is a man who does not use much of it himself, and does not induce other people to do so.

Pessimism seems to be an unknown quantity among the electric interests. Engineers, directors, and shareholders are all imbued with a strong personal faith in the value and ultimate success of their commodity. They are all informal canvassers; and many are more than that—they are enthusiasts, and do not sit down at a dinner table without enlarging on their particular hobby. This point may be emphasized by a homely illustration from actual fact. I happen to be blessed with daughters who are fair specimens of the modern high-school girl, and have attained to an age when they begin to think of putting their hair up and adopting long skirts. They cycle, play tennis and hockey, and can go for the middle wicket or throw up from a corner of the boundary at cricket as well as their brothers; and they discuss questions of the day with a freedom and assurance that sometimes staggers their older and more cautious parent. Sometimes they bring home school chums; and one of these young ladies (not aware that she was accepting the hospitality of a gas manager) delivered quite a panegyric on electric light, dealing seriatim with the whole of the advantages claimed for it as compared with gas. An inquiry as to what particular friend had supplied all this information, elicited the fact that her brother was engineer of an important electrical enterprise. But the point of the story is this: A few days afterwards my girls were unobtrusively cross-examined with

a view of ascertaining whether they ever talked-up gas when out visiting; and it was soon evident that they took no personal interest in the subject. Is not this a fair example of the general condition of things with shareholders, directors, and even gas managers? Discussing gas questions the other day, a gentleman jocularly remarked that it might be a good thing for the gas industry if all dividends were stopped for a twelvemonth. In some cases a portion of the energy exhibited by electric stockholders may be due to the fact that dividends are as yet almost unknown quantities; and perhaps if gas shareholders could be induced to believe that the security of their dividend depended upon increased sales, they would exhibit a more lively personal interest in the subject.

(To be continued.)

TECHNICAL RECORD.

CONCRETE SUBWAYS FOR UNDERGROUND PIPES.

At the Meeting of the Society of Engineers, held at the United Service Institution, Whitehall, on Monday last week, a paper on the above subject was read by Mr. A. Taylor Allen.

The author commenced by referring to the construction of the first subway in England for underground pipes, which took place about the year 1860, in the City of London. This was followed a year or two later by one in Nottingham. He noted the lack of progress made in the extension of these new arterial thoroughfares; for, beyond the construction of one at St. Helens in 1898, very little had been done in this direction to minimize the evil resulting from the continuous disturbance of roadways for access to the pipes beneath. He gave a long list of streets broken up in the course of one year for obtaining access to pipes, and pointed out the danger and inconvenience likely to arise from roadways being made over a number of gas-pipes, which might soon prove to be of insufficient capacity or become defective, and over water-mains that were laid years ago when the water supply was very limited. He went on to refer to the sections of the various Acts in force empowering public companies to break up streets after due notice, causing the total or partial blocking of a thoroughfare, interfering with traffic, and operating temporarily to the prejudice of business houses—the owners having no claim for any loss sustained thereby. He then alluded to the increasing number of underground pipes, and the possibility of the provisions of the Rivers Pollution Prevention Acts being more rigidly enforced, and in the near future throwing upon some authorities the necessity of having separate sewers for surface or storm water. He described the subways in London, Nottingham, and St. Helens; and, to relieve doubt as to the possibility of a severe frost affecting the water-mains in them, he gave thermometrical readings taken in the Albert Street subway at Nottingham.

Turning next to the utility of subways, the author stated that by their construction access could be readily obtained for the purpose of inspection, alteration, or addition to any of the pipes at present hidden and placed beyond inspection. He drew attention to the fact that after works of great magnitude had been undertaken in obtaining a supply of pure water, the pipes conveying it were hidden. Thus, a defective joint or a burst might remain undiscovered for a length of time. An efficient system of detection and prevention of water pollution or waste would be provided for by subways, and the life of iron pipes would be considerably increased. Electric and telegraph wires need no longer run along poles and roof fixtures, but could be put underground; thus rendering them less dangerous, and more reliable and permanent. Having regard to economy of cost, capability of resistance, and rapidity of execution, the author suggested concrete as the most suitable material, and referred to its practical value as exemplified by its extensive use in connection with works in general.

With regard to subways for suburban districts, the author considered all large ones should have lateral ways, about 3 feet wide and 4 ft. 6 in. high, for the purpose of access and the conveyance of gas, water, and other pipes; and he advocated making use of every available space by a specially designed iron bracket for the pipes. He submitted a proposal for a subway under each footpath of all new streets, to receive the water, gas, and other pipes—the subways to form part of the laying out of the new street. He considered it necessary for the gas and water mains to be in duplicate. The concrete wall nearest the house would be perforated with 2-inch and 2¾-inch holes for the services; thus obviating the construction and expense of lateral ways.

The author gave the cost of some subways constructed in London as £15 per lineal yard, Nottingham as £10, St. Helens as £7 2s. 4d. He pointed out, however, that the information was of but little practical value, and must be accepted with the greatest caution, it being impossible to make a useful comparison between the cost of construction at other places without a knowledge of the conditions of each case. Although the initial cost would be heavy, he pointed out that there might be some compensation if the excavated materials proved suitable for the concrete work. He considered that the cost of making subways should be borne by a loan for a period of fifty years, as these structures come under the category of permanent works.

ANALYSIS AND PURIFICATION OF ACETYLENE.

A valuable address on this subject, compiled by Herren A. Rossel and E. Landriset, was delivered at the inauguration of the Swiss Carbide and Acetylene Association at Berne. The following summary of its contents is made from the "Zeitschrift für angewandte Chemie," in which the address is published.

The degree of purity of acetylene depends on the method of generation as much as on the quality of the carbide used. The composition of crude acetylene has been given so differently, that exact analyses were undertaken to determine the impurities. Of those which may occur, hydrogen, nitrogen, oxygen, and marsh gas are without great effect on the illuminating value of the gas, provided they are present only in small quantities; but ammonia, sulphur compounds (especially sulphuretted hydrogen), and phosphuretted hydrogen can, even in smaller quantities, affect the gas. Hempel's apparatus, with a slight alteration of the gas-cocks of the measuring burette, was used for the analyses, and gave good results. In order to procure acetylene free from air, a generating flask of 5 to 6 litres capacity was taken, provided with a thistle funnel reaching nearly to the bottom of the flask, and with a gas-exit tube. The flask was filled up with water, which was saturated with acetylene by slowly introducing 40 to 50 grammes of granulated carbide. After closing the gas-exist tube, a further 20 grammes of carbide were added, and the thistle funnel was inserted, thereby causing water to be expelled.

The crude acetylene, which was free from air, then served for the determination of all admixed gases which sulphuric acid would not absorb. The generating flask was connected with a calcium chloride tube, which communicated with the Hempel's burette filled with clean mercury. The upper stop-cock of the burette was constructed so that air might be readily expelled from the tube by acetylene. 100 c.c. of acetylene free from air were then drawn into the burette; and the temperature and pressure were read. The gas was then passed over into the fuming sulphuric acid pipette, and the gaseous residue remaining unabsorbed after 24 hours was measured. In this residue, oxygen was determined by absorption in the potassium pyrogallate pipette, hydrogen and methane by explosion, and the residue was assumed to be nitrogen. According to this general method of procedure, many analyses were made on samples of acetylene from commercial carbide of calcium, yielding 4·65 cubic feet of gas at 59° Fahr. and 760 mm. per pound. The following are the average results of such analyses:—

—	Series No. 1.	Series No. 2.	Series No. 3.
Hydrogen . . . . . vols. per cent.	0·20	0·3	0·25
Oxygen . . . . . ,, ,,	0·10	0·1	0·15
Nitrogen . . . . . ,, ,,	0·10	0·2	0·20
Methane. . . . . ,, ,,	..	..	..

The hydrogen arises from particles of metallic calcium in the interior of the lumps of carbide. Calcium on the surface of the carbide does not produce hydrogen, as will be explained later. Series Nos. 2 and 3 relate to carbide made with an excess of lime; and the amount of hydrogen found shows that the metallic calcium in the carbide is not thereby appreciably increased. When an alternating current is used in the manufacture of the carbide, a portion of the excess of lime is volatilized; and the remainder remains in a fused state, but chemically unchanged, in the carbide formed, which is finely crystalline, but nevertheless is of low quality. Oxygen and nitrogen were always detected in crude acetylene; but it is believed that the analytical results prove that, with normally made carbide, the quantities present are so small that they cannot exert any injurious effect on the practical application of the carbide, or on the illuminating value of the acetylene. Methane was not detected; and it therefore appears improbable that aluminium carbide had been formed in the furnaces from which the samples were drawn.

Ammonia is always present in crude acetylene. Dolomitic lime increases the quantity; and therefore magnesia must be regarded as injurious in carbide manufacture. A portion of the magnesia becomes reduced, and yields, when the carbide is exposed to the air, magnesium nitride, which, with water, produces ammonia—

$$Mg_3N_2 + 3H_2O = 3MgO + 2NH_3.$$

Actually, however, ammonia can be detected qualitatively, even in the absence of magnesia, if water is dropped on carbide, so that the mass heats up strongly. In this manner, carbide made from pure carbon and absolutely pure lime has yielded ammonia. It appears that particles of calcium on the exterior of the carbide form a nitride, and give rise to a similar reaction to the magnesium nitride. Commercial carbide made under normal conditions, and yielding 4·8 cubic feet of gas per pound, when decomposed by dropping water on it, gave ammonia in amount equivalent to the following volumes per 100,000 of the gas:—

Sample	No. 1 (contained magnesia) . . .	552 volumes.
,,	No. 2	250 ,,
,,	No. 3	242 ,,
,,	No. 4	335 ,,

Acetylene produced by dropping water on to carbide may contain as much as 500 volumes of gaseous ammonia per 100,000 of gas. The amount of ammonia may, however, even become reduced to *nil* if the acetylene is generated by projecting carbide

into water. In the purification of acetylene, the presence of ammonia must, nevertheless, always be taken into account.

The amount of sulphur in crude acetylene likewise varies with the manner in which the gas is generated. The sulphur compounds, however, are more detrimental to the illuminating power of the gas than is ammonia; and they must be specially considered in connection with the purification of the gas. When carbide is projected into a large volume of water, no trace of sulphuretted hydrogen results; but when water is dropped on to carbide, a great part of the sulphur present escapes as sulphuretted hydrogen and other sulphur compounds. This fact led to the construction of an apparatus for controlling the manufacture of the carbide by determining the quantities of volatile sulphur compounds and of phosphuretted hydrogen which it yields under different conditions. Into a flask of 6 to 7 litres capacity, 5 litres of water are put; and through two holes in the plug are inserted a glass rod, about 20 inches long, which can be easily pushed through the hole, and a gas-exit tube. A small perforated zinc basket, capable of holding 25 grammes of pulverized carbide, is suspended beneath the plug on the end of the glass rod. On submerging the basket, gas is evolved, and is passed through wash-bottles, containing reagents, to an exactly graduated gasholder of 10 litres (0·35 cubic foot) capacity, and not more than 4 inches in diameter. A gas-meter, with pressure gauge and thermometer, may be inserted between the wash-bottles and the gasholder; but satisfactory results can also be obtained by measuring the gas directly in the holder. In order to saturate the 5 litres of water in the generating flask, 60 grammes of carbide are added in two lots. The water in the gasholder is saturated with common salt. The saturation of the generating water is of the utmost importance for this method, in which only small quantities of carbide are used with relatively great quantities of water. When 25-gramme test samples are used in quick succession, the temperature of the water in the generating vessel rises 1·8° to 2·7° Fahr. for each test; but the water in the gasholder is not affected. The same generating water will serve for at least 50 tests before the lime sludge obstructs the action; and as the connection to the gasholder is fairly long, the temperature of the latter will not rise above that of the room. A great rise of temperature in the generating vessel is avoided by limiting the number of tests carried out in uninterrupted succession.

If the little basket containing the 25 grammes of carbide is brought entirely beneath the surface of the water by pushing down the glass rod, no trace of sulphuretted hydrogen will escape with the acetylene; and the gas will not cause any discoloration of a solution of lead acetate if it is passed through it. If, however, the basket is merely pushed down to the surface of the water, so that only the lower pieces of carbide are moistened, the temperature in the basket rises above 212° Fahr., vapour is formed, and the solution of lead acetate rapidly is coloured black, owing to the production of a precipitate of lead sulphide.

For fixing the relative proportions of water and carbide, it appeared important to ascertain to what limit the reaction remained the same. When 500 grammes of carbide are thrown at once into 5 litres of water, the temperature does not reach 122° Fahr., and the reaction is unaltered; when the carbide is increased to 1250 grammes, the temperature of the water becomes 185° Fahr., vapours appear, and the lead acetate in the wash-bottle begins to be coloured brown, though there is not any marked precipitate. No polymers of acetylene are formed under these conditions. Practically, 50 kilos. of carbide can be decomposed in 200 litres of water without the quality of the gas being deteriorated, especially when the carbide is added by degrees, so that the operation lasts about half-an-hour. The gas evolved will, however, carry off with it small quantities of sulphur compounds, and will contain phosphuretted hydrogen.

Analyses showed that carbide contains from 1·5 to 3·5 parts of sulphur per 1000 parts by weight. If acetylene is generated by dropping water on to carbide, the formation of volatile sulphur compounds is unavoidable. They may be quantitatively determined by passing the gas through a not very strong alkaline solution of sodium hypochlorite, which oxidizes the sulphur completely to sulphuric acid. If the gas is first passed through a solution of lead acetate, the sulphuretted hydrogen will be removed from the other sulphur compounds, which do not combine with the lead salt. The maximum amount of sulphur in the form of volatile compounds found in acetylene made by projecting carbide into water, is 9·2 grains per 100 cubic feet, which is equivalent to 6·2 parts by weight per 100,000 parts of carbide used; or not more than 2·1 per cent. of the sulphur in the carbide is found in the acetylene produced. But in acetylene produced by dropping water on to carbide, the sulphur found in the gas is equivalent to from 11·1 to 18 per cent. of the total quantity of sulphur in the carbide. It is chiefly in the form of sulphuretted hydrogen; and the minimum quantity found is 48½ grains per 100 cubic feet of acetylene.

The presence of these sulphur compounds in crude acetylene demands careful purification of the gas; for Landriset has shown that acetylene burners oxidize the sulphur not merely to sulphur dioxide, but to sulphur trioxide, which forms sulphuric acid with the moisture of the atmosphere. The whitish, disagreeable fumes which are often produced by the combustion of acetylene are to be ascribed, in great measure, to these vapours of sulphuric acid. But before dealing with sulphur purification, the phosphuretted hydrogen in crude acetylene must be referred to.

It appears from analyses that no greater importance need be attached to the phosphuretted hydrogen than to the volatile sulphur compounds in crude acetylene. For carbide manufacture, coal, &c., which invariably contains more or less sulphur has to be used, and therefore the sulphur compounds have always to be reckoned with; but with phosphorus, the case is different. Limestone which is free from phosphorus is not rare; and there is always only a little phosphorus in coal. In carbide of good quality, 52·5 parts by weight of phosphorus per 100,000 parts of carbide is the most observed; and only a portion of this quantity is converted by water into phosphuretted hydrogen. On the other hand, the phosphorus in one case amounted only to 6·3 parts per 100,000 of carbide.

The total quantity of phosphorus in carbide is ascertained by determining the amount in the residue after generation of acetylene, and the volatile portion in the gas by oxidation with sodium hypochlorite. The solution of hypochlorite, through which a known volume of the gas has been passed, is treated with hydrochloric acid, and filtered; and the phosphoric acid is precipitated, after neutralization, with magnesia mixture. The maximum amount of phosphuretted hydrogen found is 53·3 volumes per 100,000 volumes of acetylene; and this is equivalent to 24 parts by weight per 100,000 parts of carbide used in the production of the gas.

Turning, now, to the purification of crude acetylene, the substances to be removed are:

Ammonia, amounting to from 0 to 500 vols. per 100,000 vols. of the gas.
Sulphuretted hydrogen, amounting to from 0 to 250 vols. per 100,000 vols. of the gas.
Phosphuretted hydrogen, amounting to from 20 to 53·3 vols. per 100,000 vols. of the gas.

It is also necessary to avoid the formation of polymers of acetylene, which cause the fine openings in the burners to become choked. It must be pointed out primarily that the carbide must be decomposed by means of a sufficient quantity of water. The ratio of 50 lbs. of carbide to 20 gallons of water does not cause heating up to 212° Fahr.; no polymerization occurs; and the greater part of the sulphur remains behind in the residues. The gas is washed with half as much water as was used for its generation—*i.e.*, with 10 gallons of water for every 50 lbs. of carbide used.

The water used in washing serves to cool the gas, to retain impurities mechanically carried by it, and to remove the ammonia present. To remove sulphuretted hydrogen, 2 to 4 lbs. of milk of lime, or lime sludge, are added to the water for washing. If sufficient water has not been employed in the generator, it is particularly necessary to charge the water for washing with so much lime that every trace of sulphuretted hydrogen is absorbed by it. If ammonia and by far the greater part of the sulphur are retained according to this simple method, there remain in the gas only small quantities of sulphur compounds and the phosphuretted hydrogen. The removal of the latter is effected on the same principle as its estimation; and chloride of lime is the material practically employed for the purpose.

The advantages and disadvantages of the numerous methods of purification have been exhaustively dealt with in the literature on the subject, and need not be discussed here. Even a small chloride of lime purifier becomes superfluous if a small quantity of chloride of lime is put in the generator itself. For instance, from 0·5 to 2 per cent. of the weight of carbide answers perfectly well. The chloride of lime completely oxidizes the phosphuretted hydrogen and the sulphur compounds. So that if the water in the washer is made alkaline with lime, neither ammonia, nor sulphuretted hydrogen, nor phosphuretted hydrogen will escape. Thus this simple and cheap process removes or retains the whole of the impurities. In a generator in which carbide is projected into water, if 40 gallons of water and 100 lbs. of carbide are used, from ½ to 2 lbs. of chloride of lime should be added to the water in the generator each time it is recharged. The spent chloride of lime will be removed with the lime sludge. Analyses have proved the advantages of this simple process; for the gas resulting from its adoption is quite free from sulphur, and contains at the most 5·4 grains of phosphuretted hydrogen per 100 cubic feet of acetylene. It is therefore recommended that acetylene should be purified in the following manner:—

(1) That the contact of the gas with the lime sludge in the generator be made as intimate as possible.
(2) That chloride of lime equivalent to 0·5 to 2 per cent. of the weight of the carbide be added to the water in the generator.
(3) That the gas be washed and cooled in lime water before it is admitted to the gasholder.

There are no disadvantages; the great dilution and the excess of lime prevent the escape of chlorine and the formation of chloride of nitrogen.

There is, finally, one other point to which attention might be given. The gas should be delivered at a pressure which is as nearly constant as possible. A constant pressure of 24 tenths of an inch of water at the distributing centre affords a beautiful light; and the pressure may be raised to 32 tenths without disadvantage. But a higher pressure is bad, especially with most suitable new burners. A Bray burner gives a faultless flame under a pressure of 32 to 40 tenths, provided it is constant, and the gas is not contaminated with sulphur and phosphorus. At either a higher or a lower pressure, the flame wavers and produces soot. The burners made by Stadelmann, v. Schwarz (Nuremberg), and Bahni (Biel) behave better; but they also only give a

steady flame if the gas pressure is kept constant, and the gas is subjected to simple rational purification. This observation indicates that a gasholder of adequate size should be employed, and that automatic generating apparatus without a pressure regulator is undesirable.

REGISTER OF PATENTS.

Incandescent Gas-Burners.—Hooker, W., of Woodside, near Croydon. No. 8942; May 15, 1900.

This is a modification of the "platinum thimble" burner patented by the present inventor and D. Murray in 1888, as it has been found that, in order to obtain any satisfactory result from the thimble, certain precautions must be observed as regards: (1) The size of each perforation; (2) the number of perforations per unit of surface of the platinum; (3) the construction of the burner to which the thimble is attached; (4) the provision of an adequate supply of oxygen for the combustion of the gas or vapour; and (5) the pressure at which the gas is supplied to the thimble. To obtain the best results, it is said that "the burners should be so constructed that the mixed gas and air will issue from the burner in the form of a hollow cylinder, and burn wholly inside the platinum thimble—no air outside the thimble being required for the combustion of the gas." The gas and air may be mixed by any of the usual mixing devices, preferably before arriving at the burner, as the result is not so good when the ordinary bunsen burner in which the gas draws the air through openings in the burner is used.

The diameter of each perforation found suitable for gas at ordinary pressure is about 0·0137 inch; and the number of perforations should be about 2500 to the square inch. The construction of burner in conjunction with which the thimble is used is advantageously of the form shown—that is to say, it comprises an outer tube, having arranged centrally within it a core, so as to leave an annular space through which the mixture of gas and air passes. There is a layer of wire gauze at the bottom of the annular space, for the purpose of preventing the gas from lighting-back. The flame produced is in the form of a hollow cylinder; and it burns wholly within the platinum thimble.

In order to obtain a thorough mixing of the gas and air, a jet of water from the main or from a suitably placed tank may be employed to carry air with it into a vessel from which the water is allowed to escape while the air is forced into the pipes with the gas—the proportions of air and gas being regulated by a suitable governor.

Incandescent Gas Lighting.—Plaissetty, A. M., of Paris. No. 9088; May 16, 1900.

The object of this invention is to obtain filaments composed of salts of thorium, cerium, or of other rare earths, and of a suitable organic matter, characterized by the comparatively small amount of organic matter they contain.

The patentee proposes to dissolve the salts to be incorporated in the organic matter in a small quantity of water, and then, by means of evaporation, concentrate this solution to the weight of the salts incorporated. In certain cases, the evaporation can be carried to such a degree that the weight of the residue is less than the weight of the salts employed; and there is thus obtained, according to circumstances, either an inferior hydrate or a corresponding quantity of anhydrate, or basic salt. In this manner, a melted mass is produced, to which a small quantity of alcohol is added, drop by drop. This causes an escape of nitrous vapours, and transforms a portion of the nitrates into acetates. Directly the evolution of nitrous vapour ceases, no more alcohol is added. When the correct amount of alcohol has been added in the proper manner, the solution of the salts is sirupy in character. It is then mixed with the binding material—such as gelatine, collodion, or nitro-cellulose, in acetate of ethyl or other solvent—in proportions varying according to the nature of the binding material. The resulting product can be drawn out, "forming solid wires or threads, which do not explode, can be directly employed, and shrink but little, owing to the relatively small quantity of binding material."

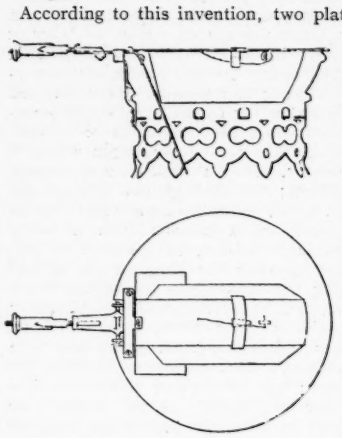
To make the threads more supple, and to transform the nitrates and acetates into oxides, the threads are soaked in an ammonia bath; and when dry they are ready to be woven into mantles. Before incineration, the mantles weigh about 1·5 grammes; whereas a mantle obtained by impregnation or by any other process weighs from 3½ to 5 grammes. By sensibly reducing the proportion of organic matter, illuminating bodies made according to this invention can be at once burned on ordinary burners, without being previously subjected to a burning process—a result hitherto unobtainable. Besides, it is claimed that illuminating bodies made according to this invention are "much less fragile than the ordinary mantles, they are not liable to break during transit, can be handled before burning without risk of breakage, and are produced at a low cost."

Starting Gas-Engines.—Bellamy, A. R., of Stockport. No. 12,927; July 18, 1900.

As a means for braking or locking the fly-wheels of gas-engines before the initial starting explosion, the patentee proposes: (1) To adapt a lever to engage with, and retard, the fly-wheel, held in position by a spring or load sufficient to withstand the force of the compressed charge behind the piston, but which spring or load is overcome on the increased pressure consequent on the firing of the charge, so that the retarding or locking means are automatically removed. (2) For the indicated purpose, a lever mounted in a cam slot or groove is adapted to advance or retract the lever from the fly-wheel of the engine, and a spring or load is arranged to maintain the lever in engagement with the fly-wheel of the engine, and so retard or lock same during the compression of the initial starting charge, but which spring or load is overcome on the explosion of the charge—the cam, slot, or groove withdrawing the locking-lever.

Self-Ignition of Gas.—Prescher, H., of Vienna. No. 11,506; June 25, 1900.

According to this invention, two plates of mica or other suitable material, set at an angle to each other, are suspended above a gas-burner; the plates being free to turn about an axis and counterbalanced. The under-surface of the top plate (preferably perforated) carries the thread or other igniter, as shown. The axis of the plates is preferably carried by a cap (the sides of which are perforated) on the top of the chimney; or it may be suspended above the gas-burner in any suitable manner.



The action of the apparatus is as follows: When the gas is turned off, the under-surface of the top plate carrying the igniter rests on the top of the supporting cap; the lower plate hanging down in the chimney. When the gas is turned on, it is lighted on coming into contact with the igniter, whereupon the draught caused by the combustion turns the plates about their axis, until the lower plate closes the top of the cap, and so protects the igniter from direct contact with the products of combustion.

The igniter is preferably formed of threads of platinum on which finely divided platinum has been precipitated. This may be effected mechanically by mixing platinum black with a cement (such as sugar, starch, or the like), and dipping the threads in and afterwards annealing them. To effect it by a chemical process, the wires are coated with platinum perchloride, and afterwards annealed.

Manufacture of Gas and Coke.—Johnson, J. Y.; a communication from the Deutsche Continental Gas Gesellschaft and Dr. J. Bueb, of Dessau, Germany. No. 13,814; Aug. 1, 1900.

The object of this invention is "to provide a process whereby, in addition to good illuminating gas being obtained, coke is obtained which is in no way inferior to that produced in coking-ovens."

The patentees do not illustrate their specification, but say: According to this invention, the gas-retorts are charged with coal, which is in a fine state of division, and which has been liberally moistened with water. The retorts are entirely filled with this moist powdered coal; and then the coal is heated in the usual (or any suitable) manner for gas making. The coke which is left in the retorts is of such a character that it can be utilized to advantage in all cases where hitherto only the employment of coke from coke-ovens has been practicable. The moistening of the charge with water is a proceeding already known in the manufacture of coke in coke ovens (see Dürre's "Die neuen Koksöfen," Leipzig, 1892, p. 37); but, in such manufacture, the operations are conducted under conditions totally different from those prevailing at gas-works. In coke manufacture in coke-ovens, large masonry or brick structures are used, which it is impossible to keep air-tight, and in which the gas to be driven off has to make its way through deep layers of coke, heated to an intense red heat; the air which gains access through the joints becoming decomposed and causing the gas to be mixed with nitrogen and carbonic acid, so that the escaping gas is of a very inferior quality. At gas-works, on the other hand, operations are carried on in retorts into which air cannot gain admission, and wherein the gas is not compelled to flow through deep layers of coke. The fact that, by substituting finely divided or ground and moistened coal for lump coal (which lump coal has hitherto been regarded as essential to satisfactory operations in gas making), both excellent lighting gas and coke equivalent in quality to that obtained in coke-ovens can be obtained, has not been known to gas manufacturers.

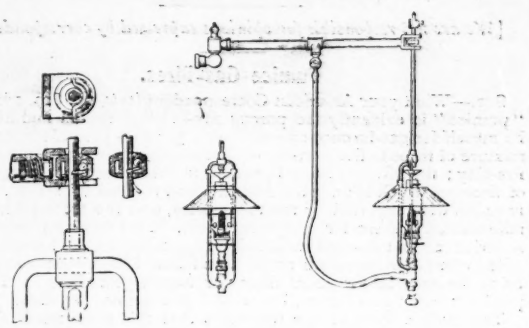
The finely divided coal, without receiving any extraneous addition, or undergoing any preparatory treatment, except being liberally moistened, is gasified in the usual retorts of gas-works. It is in this feature that the present invention essentially and fundamentally differs from that disclosed in the German patent No. 26,093, whereby the coal was first exposed to air, then washed, next reduced to fine coal, afterwards completely dried, then mixed with tar, and lastly gasified in upright retorts. Neither is the object of this previous method the same as that of the present invention; the object of the former being merely to produce illuminating gas not requiring any subsequent purification—the coke being the ordinary low-grade coke of gas-works; whereas the object of the process according to this invention is to obtain valuable coke, as well as good illuminating gas, which, however, must be subjected to purification.

Suspension Fittings for Pendant-Lamps.—Mucke, F., and the Deutsche Continental Gas Gesellschaft, of Dessau. No. 14,494; Aug. 13, 1900.

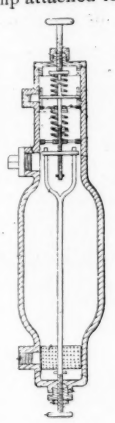
This invention relates to fittings for enabling lamps and other like pendant articles to be securely suspended, and to be capable of ready adjustment in height, while being free to swivel or swing within the supporting bracket or carrier.

The illustrations (next page) indicate the scope of the invention. They show: A sectional elevation of the suspension fitting; a sectional reverse plan of same, with the cap removed; a sectional view of the holder with clipping ball in another position; an elevation of the bracket and holder with the lamp in position; and a front view of the lamp.

When employing the suspending device for use with gas, there is formed upon the arm of the bracket which is to carry on its outer



end the sliding and swinging lamp-stem, a branch or ordinary union, to supply the gas through a flexible or jointed pipe-connection to the lamp attached to the end of the suspending-stem.



Gas Governor and Enricher.—Jennings, W. E. A., of Twickenham. No. 15,712; Sept. 4, 1900.

This invention (designed to supply a more efficient adjustable regulator for gas pressure, combined with means for enriching the gas) consists of a vertical cylinder with an inlet near its lower end, and an outlet near its upper end. Between these two openings are two valves operated by a spindle passing through a screw in the cap or plug of the top end of the cylinder. The gas flows upward between the two valves; and the space through which it passes is regulated by a wheel or key on the top of the spindle. The lower valve is also regulated in relation to its distance from the upper valve by a rod from below, terminating in a fork, by means of which the diaphragm can be raised or lowered on the upper spindle. In the lower part of the cylinder, "albo-carbon" or the like is stored for enriching the gas; and an aperture, closed by a plug or cap, is added for the admission of the albo-carbon, and for affording access to the lower diaphragm.

Gas-Engine.—Lossignol, C., and Heinen, L., of Lille, France. No. 152; Jan. 2, 1901.

This engine is of the four-stroke type (admission, compression, expansion, and exhaust); but while using this cycle, the patentees claim to have made modifications in its various phases which form characteristic points of the engine.

The admission phase is the same whether the engine works with a full or with a reduced charge. With a full charge, the admission begins at the end of the in-stroke, and terminates at a suitably selected point of the next out-stroke. This point is fixed according to the quality of the combustible. With a reduced charge, the admission only commences when the piston has already traversed a given part of its out-stroke, and terminates at a point between the beginning of the stroke and the final point of admission for the full charge. The beginning and end of the admission period are controlled by the governor. The quality of the combustible is not varied in any way; but the quantity admitted varies according to the power to be developed. With a full, as with a reduced, charge there is a partial vacuum after the admission-valve has been closed until the end of the piston stroke.

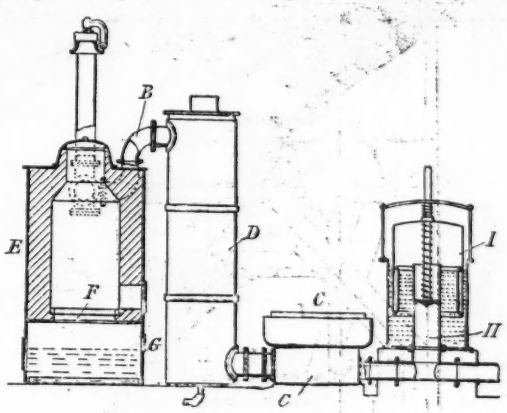
During the whole of the compression stroke, the piston compresses the gas contained in the cylinder; and at the end of the stroke the explosion takes place. The gas expands during the whole of the stroke. The exhaust period begins immediately after the complete expansion of the gas. It terminates with a full charge, at the end of the in-stroke of the piston, and with a reduced charge at a suitably selected point of the stroke. Thus a certain quantity of burnt gas is left in the cylinder.

The smaller the power to be produced, the greater the amount of burnt gas left in the cylinder. This burnt gas is compressed by the piston until the end of the stroke. With the following stroke, in proportion as the piston advances, the burnt gases expand; and their pressure equals the pressure of the atmosphere. The admission of the combustible gas commences at once through an automatic mixing valve. As there remains in the cylinder a large quantity of burnt gas when the power to be produced is to be less, the admission of the combustible gas begins later, in order to terminate (as has been described for the admission period), at a point between the beginning of the stroke and the extreme point of admission, with a full charge. It results, therefore, that, in proportion as the power to be produced decreases, the compression, favoured by the retention in the cylinder of a certain part of the burnt gas, augments (without, however, having influenced) the composition of the mixture.

Generation and Supply of Gas for Power Purposes.—Pintsch, J., of Berlin. No. 4522; March 2, 1901.

This invention relates to apparatus whereby the generation of gas takes place at a constant pressure, but only during the suction period of the gas-engine, and in exact proportion to the gas-feed necessary for the said engine.

The apparatus works at a pressure below that of the atmosphere, and with gas generated by the combustion of coke, coal, or the like—as shown in the accompanying sketch. It comprises a gas generator E, a gas-engine (not shown), a pipe leading from the gas-suction chamber of the engine and connected immediately to another pipe, which leads through a purifier C and condenser D to the top of the generator, means for admitting air and steam to the generator, and an elastic gas-rarifier inserted in the pipe-connection between the engine and the generator. The generator, if water gas is required, is advantageously provided with a water-tank underneath the grate F. The water in the tank being heated by the heat from the grate, and thus slowly caused to



vaporize, produces sufficient steam to generate the necessary quantity of gas for the suction period of the engine. Beneath the grate an air-inlet opening G is provided, which may be adjusted to the necessary size by any suitable means (not shown), so as to admit just sufficient air to the generator to retain the fire in it at the proper glow-heat.

During the suction period of the gas-engine—*i.e.*, the period in which the piston draws in a sufficient amount of gas to cause the explosion subsequently—sufficient air and steam will be drawn by suction through the grate of the generator to enable the generation of a certain quantity of gas. The suction of the engine, however, will draw the gas direct to the engine; so that the gas, the generation of which is dependent on the amount of suction of the engine, will be immediately consumed by the latter. Since, however, after the suction of the engine has ceased, a comparatively small amount of gas will still be developed (which might cause a dangerous increase of pressure, or in any case would decrease the required vacuum, and thus decrease the efficiency of the plant), a pressure-regulator, constructed as follows, is arranged in the inlet-pipe: A vertical pipe H extends upwardly from the supply-pipe; and over the open end of it is arranged a small bell I, which is pressed upwards by means of a suitable spring or float, so as to prevent the atmospheric air pressure from destroying the vacuum required for the proper working of the plant. If now gas is drawn from the generator E during the suction period of the gas-engine, the suction will in a certain measure influence the bell I, and pull it slightly downwards. As soon as the suction ceases, the bell will return to its normal position under the influence of its float or spring; and in so doing, it will draw the gas, developed in the generator E after the suction period has ceased, out of the generator, and thus prevent the generation of gas pressure in the plant. The construction of the pressure-regulator forms no part of the present invention, and any suitable generator can be employed.

Raising, Breaking, Sorting, Conveying, and Loading Coke at Gas-Works.—Mitchell, H. J., of Hornsey. No. 7304; April 9, 1901.

The object of this apparatus is such that the coke, after it leaves the retort-house, can be raised from the heap, then broken, sorted, sifted, conveyed, and loaded into the delivery sacks or carts, practically without manual labour.

The engravings (next page) show a vertical sectional elevation of the apparatus, and a back and a front elevation.

A is the top hopper, continually supplied with coke. B is the operating lever employed to facilitate the release of the coke from the hopper. C is the door which causes the coke in A to travel downwards; the lever being first pushed upwards, and then, when released, allowed to fly back by its own weight. D is the outlet-shoot of the top hopper, the exit door of which consists of a series of fingers similar to those (S) which control the exit of the coke from the lower hopper N as hereafter referred to. E is a lever for operating the fingers. F is the coke-crusher. G is the screen over which the broken coke, and through which the breeze, pass. H is the breeze-shoot, with a grating or screen for sifting the dust from the breeze. J is the dust-shoot. K is the lower hopper, into which the coke for delivery falls from the crusher and its shoot and screen. L is the operating weighted lever for working the door of the lower hopper, and which allows the exit of the coke when the lever is pushed upwards, and then when released permits it to fly back by its own weight. M is the lower hopper-door used in conjunction with the lever L. N is the delivery or outlet shoot of the lower hopper. O is the main closing or controlling door of the lower hopper. P is a counterbalance passing over a pulley for closing the door O, and (by its weight) retarding the exit of the coke. Q is a rod in conjunction with a lever for opening the door against the weight of the balance P. R is a pedal, to be operated in conjunction with the rod Q for opening the door O. S is a series of bars or fingers loosely hung at the delivery-end of the lower hopper-shoot. These form a very special feature in the invention, in so far that they accommodate themselves to the inequalities of the coke as it is delivered; and by means of the handle they "effectually serve to control and regulate the final delivery of the coke to the sack or cart." T is the engine-house. U is the engine-pulley. V is the countershaft. W is the pulley on the crusher F.

By reference to the engravings, the construction of the apparatus and the method of working adopted in the raising of the coke from the heap to its ultimate delivery in the sack or cart is quite obvious. But the patentee specially emphasizes the importance of the angles or slope at which the inclined sides or bottoms of the top and bottom

hoppers are arranged, so as to impart a uniformly accelerating motion to the coke; and at the same time he draws attention to the operating-levers B and L at the outlet-doors of the top and bottom hoppers re-

Fig. 1.

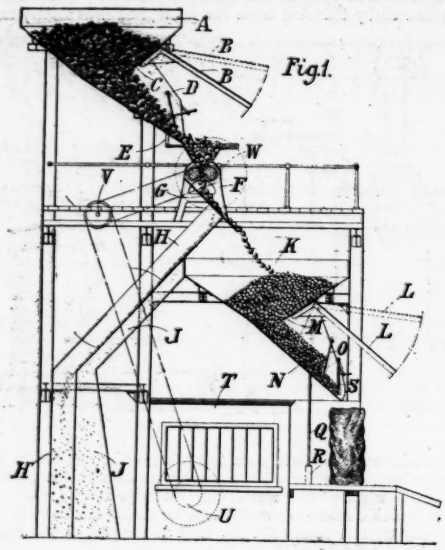


Fig. 2.

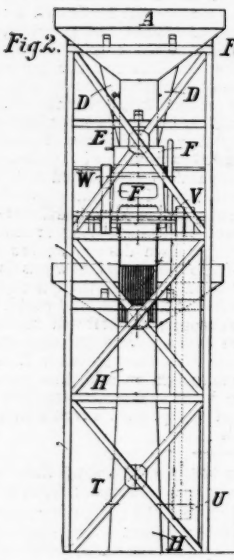
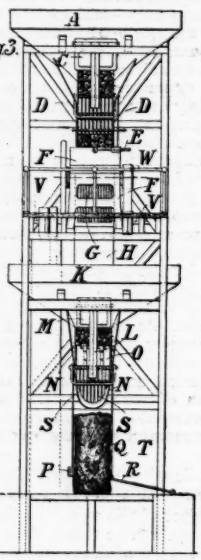


Fig. 3.



spectively, the weight and arrangement of which levers, when manipulated by the attendants, cause a vibratory motion, so as to hasten the downward travel of the coke.

APPLICATIONS FOR LETTERS PATENT.

10,923.—Hogan, G. L., "Acetylene gas generators." May 28.
10,924.—Anderson, H., "Anti-vibrators for gas-pendants." May 28.
10,930.—Alton, L. T., "Incandescent gas-lamps." May 28.
10,941.—Hoshor, J. C., and Platt, T. E., "Conveyors." May 28.
11,002.—Peto, W., and Cadett, J. W. T., "Gas or oil engines." May 28.
11,024.—Cripps, F. S., "Steel or wrought iron chimneys for gas-works." May 29.
11,027.—Thorp, T., "Fluid meters." May 29.
11,066.—Braidwood, J. F., "Self-closing water-valve suitable for gas-works purposes." May 29.
11,082.—Scott, E. G., "Distillation of ammoniacal and other liquors." May 29.
11,085.—Budzinski, S. L., "Acetylene lamps." May 29.
11,090.—Wier, M. A., "Gas and other engines." May 30.
11,120.—Wyler, B. F., "Holders for gas-globes." May 30.
11,145.—Bronder, G. A., "Retort charging apparatus." May 30.
11,167.—Morrison, G. W., "Treating and moulding carbide of calcium." May 30.
11,187.—Ledger, H., "Mantles for gas or other burners." May 31.
11,210.—Marriage, T. S., "Gas-lanterns." May 31.
11,239.—Melhuish, A. G., "Gas and oil engines." May 31.
11,248.—Lewes, G. A., "Chimneys and globes for incandescent gas lighting." June 1.
11,249.—Underwood, G. F., "Anti-vibrator for incandescent gas-burners." June 1.
11,255.—Hislop, G. R., "Incandescent gas-burners." June 1.
11,256.—Nicholls, R., "Cooking and heating with gas or other combustible matter." June 1.
11,267.—Sluce, M., "Combined apparatus for economizing consumption of gas, smoke consumer, light increaser, mantle suspender, anti-vibrator, and safety mantle remover." June 1.

CORRESPONDENCE.

[*We are not responsible for opinions expressed by correspondents.*]

Pumice Gas-Fires.

Sir,—What your American Correspondent (*ante*, pp. 819, 1502) calls "pumice" is evidently the porous fire-brick, invented and first used by myself for gas-furnace casings, some 35 years ago. It is made of a mixture of three to five parts by bulk of sawdust to one part of powdered fire-clay; the sawdust being burnt out in firing, leaving a porous mass of fire-clay which is an extraordinarily bad conductor of heat. These furnaces were exported by me to America, and the material has been manufactured there for many years past. This was also patented in America, and an attempt was made to form an English branch, which failed when the American agent found that I had been making and using the material for about fifteen or twenty years before. I am not particular as to exact dates, but what I give are near enough.

The curious part of the matter is that this same material, called "pumice" by your correspondent, was also first used by me for gas-fires, and has been adopted by every English maker; so that his so-called pumice fires are at the present time universally used in this country. The iron-fret fires I referred to were actually what he calls "pumice" fires, with a front surface of iron sprays, the iron greatly increasing the percentage of radiant heat obtained.

Your correspondent asks where I "got my figures." They are part of a series of experiments over about two years; they were repeated by myself under varying conditions, and were verified by another observer before they were published. I do not care to enter into a discussion with anonymous correspondents, and if he will forward me his name and address I will send him a copy of the results of the whole series, and also of others relating to the heating of large spaces by gas and other fuels, the method of producing artificial "climates" for hospitals and sick-rooms, and many other matters of importance to all gas engineers.

Thos. Fletcher.

Warrington, June 6, 1901.

P.S.—I find in "Chambers's Encyclopædia"—"Pomace, the substance of apples." The word "pumice" applies only to a substance of volcanic formation, and has no connection with an artificially formed spongy fire-clay.—T. F.

The New Gasholder at Hull.

Sir,—In reference to the description of the gasholder at the Hull Station of the British Gaslight Company (*ante*, p. 1505), have you not represented drawings which are not in connection with the four-litt holder under description, as the illustration of the photograph shows four lines of girders placed vertically, while in drawings Nos. 2 and 4 you show three lines of girders, two horizontal and the top vertical? Again, I shall be glad to learn how to design a holder of 3½ millions capacity with side-framing as shown, weighing in the aggregate only 702 tons. I feel sure a mistake has been made; and I think, in the interest of your readers, some correction should be made.

J. B.

June 6, 1901.

The above letter was forwarded to Mr. Wentworth, who writes thereon as follows: "With regard to the criticism of the holder, I can only say 'J. B.' has evidently not read the article very carefully, or he would have seen that, in the first place, it is a three and not a four lift holder; then, again, it is distinctly stated that the design was altered from two rows of girders on the flat to three rows on edge, to suit the design of the next holder. Then he mistakes the top girder for an ordinary lattice one; whereas had he studied the drawings he would have seen it was a box girder. With regard to the weight, I can say that if he wishes to construct a holder of this size at the weight, he can do so by copying this design, as the weights were supplied by the contractor, and agree with my quantities."

Arsenic in Malt.

A correspondent, writing on the above subject, to which reference was made in our editorial columns last week, says: "Is it possible that the barley contained arsenic before it was malted? If arsenical weed-killers are still used—and I believe they are—it is not improbable that this may account for the arsenic in the malt. I also think an arsenical mixture is used for preventing disease of the crops. Though I do not think these points affect to any appreciable extent the matter of arsenic in beer; they may have something to do with the coke question."

Lancaster Water Supply.—In the financial year ending the 25th of March last, the income from the sale of water was £15,839, compared with £15,314 in the preceding year—a difference of £525. The expenditure was £13,793, against £13,846, or £53 less than in the year 1899-1900. The net profits were £3141, or £147 less. The difference is more than accounted for by the loss of bank interest credited to the Water Department.

Payment for Rural Water Supplies.—A point of considerable interset to rural sanitary authorities has arisen at Chagford, Devonshire. Some twenty years ago a supply of water was provided for the village; the money being raised on loan in the usual way. Hitherto it has been the practice to charge to the water account the annual sum required for interest and repayment of the capital, with the result that the whole cost of the undertaking has been borne by the water consumers through the water-rate. The Local Government Board Auditor has objected to this, and has informed the Parish Council that the amount of the interest and sinking fund must be paid out of the sanitary rate. It will thus be a charge upon the whole parish instead of upon the limited area within which the water is supplied. The Parish Council have decided to take steps with a view to inducing the Local Government Board to reverse the decision of the Auditor, and allow the cost of the water-works to be borne in the future by the consumers, who, it is said, have no objection to this course.

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LIMITED,

Invite the attention of Gas Managers, Lighting Authorities, and all interested in Public Lighting to their new patent

Self-Intensifying Kern Burner

just introduced, which gives a lighting efficiency of

300 CANDLES PER BURNER

with about 10 cubic feet of gas at ordinary pressure, dispensing entirely with auxiliary compressing plant of any kind whatever.

ADMIRABLY ADAPTED FOR ALL CLASSES OF LIGHTING.

COMPRESSING PLANT OR HIGH PRESSURE MAINS NOT NECESSARY.

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Half Actual Size.

KEITH'S PATENT

HIGH PRESSURE BURNER

Has already been largely adopted by the leading Gas Companies and Corporations.

IT GIVES THE BEST LIGHT.

More Candle Power than any H.P. Burner using 10 ft. per hour.

CAN BE INSTANTLY ADJUSTED to suit the quality of Gas in any District.

The Mantle is Removable. This Burner has been SPECIALLY MADE for High-Pressure Work.

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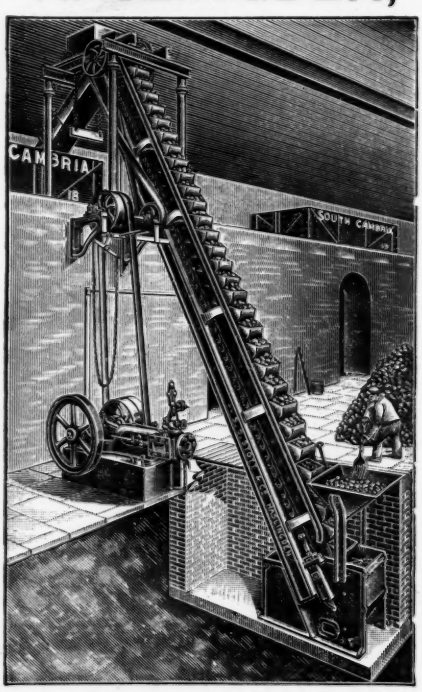

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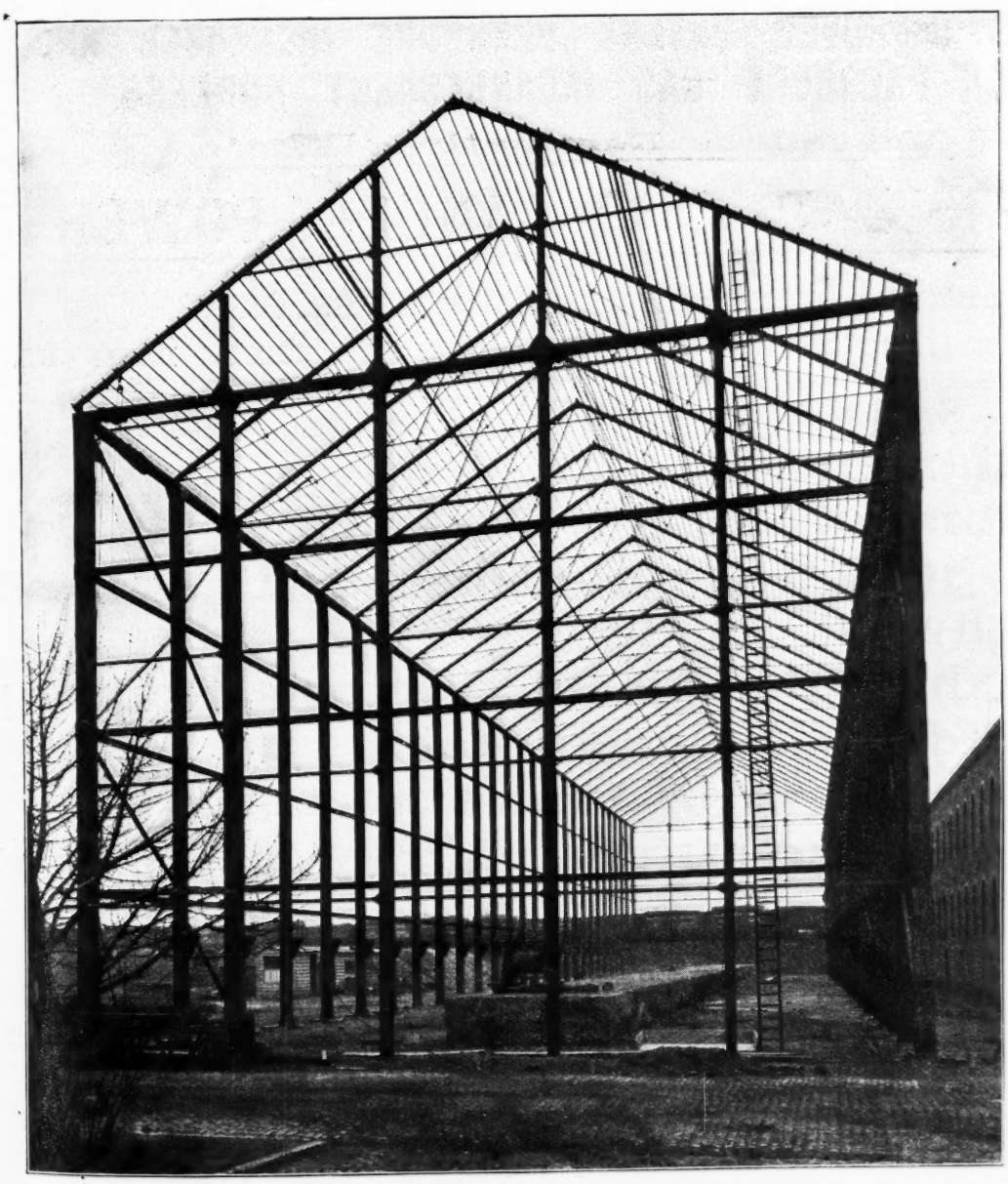

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PARLIAMENTARY INTELLIGENCE.

HOUSE OF COMMONS.

The House resumed on Thursday after the Whitsuntide recess, and since then the following further progress has been made with Bills:—

Bills read a second time and committed: Biggleswade Water Board Bill, Otley Gas Bill [Lords].

Bill reported, with amendments: Blackburn Corporation Bill.

Bills read the third time and passed: Alfreton Gas Bill [Lords], Bath Gaslight and Coke Bill [Lords], Mond Gas Bill, Omagh Gas Bill [Lords].

Petitions have been deposited against the South Essex Water Bill [Lords], by the West Ham Corporation; and against the Southport Water (Transfer) Bill [Lords], by the Southport Water Company and their officers and servants.

REFEREES' COURT, HOUSE OF COMMONS.

Friday, June 7.

(*Before Mr.* PARKER SMITH, *Chairman, Sir* CHANDOS LEIGH, *Mr.* BONHAM-CARTER, *Mr* D. H. GREENE, *and Mr.* PAULTON.)

LONDON UNITED TRAMWAYS BILL.

The Court of Referees of the House of Commons sat to-day to consider the objections raised by the promoters of the London United Tramways Bill to the *locus standi* of several of the petitioners. The petitions objected to were those of the Southwark and Vauxhall Water Company, the Chelsea Water-Works Company, the Lambeth Water-Works Company, the New River Company, the West Middlesex Water-Works Company, the Grand Junction Water-Works Company, ratepayers, owners, &c., of Surbiton, the Richmond Electric Light and Power Company, Limited, the National Telephone Company, Limited, the County Council of Middlesex, the Great-Western Railway Company, the Great-Western and the Metropolitan Railway Companies, the Metropolitan District Railway Company, and the London and South-Western Railway Company. It was pointed out at the sitting of the Committee that the Great-Western Railway Company, the Great-Western and Metropolitan Railway Companies, and the London and South-Western Railway Company had withdrawn their petitions.

Mr. BAGGALLAY, K.C., arguing in support of the *locus standi* of the first four Water Companies named, said the grounds for the petitions were common to all. These questions were becoming very serious, especially that which related to electrolytic action affecting the mains of the Water Companies when the tramways near to them were worked by electricity. Taking the Chelsea Company's petition first, he said that in their district there were several tramways which it was proposed to work under the Bill; and in one case in particular an insufficient amount of soil would be left between the electric wires and the water-mains for the protection of the latter. He was entitled to *locus standi* before the Select Committee, in order to see that proper protection was afforded against interference with the water-mains. In the notice of objection it was submitted that, so far as any of the main-pipes of the petitioners were concerned, there was ample protection contained in the Tramways Act of 1870, "except as regards the said alteration of levels."

The CHAIRMAN: Do you contend that these words admit your right to *locus?*

Mr. BAGGALLAY replied in the affirmative; but he did not know what his learned friend would say. That part of the Act of 1870 to be applied had reference only to surface work; whereas under the Bill alterations and street widenings were to be carried out which might involve serious physical interference with the water-mains. From this point of view, the Chelsea Company should have *locus standi* to be heard on the question of the merits of the Bill. He would not go into the question of whether the tramway was or was not necessary.

Sir CHANDOS LEIGH: Then you only ask for a limited *locus?*

Mr. BAGGALLAY said that was so. The Water Companies were merely looking to the protection of themselves and those they had to supply with water. If they had desired a landowner's *locus*, they could have had it, as the promoters proposed taking a portion of the freehold property of one of the Companies. Dealing next with the case of the Lambeth Company, he pointed out that in connection with several Tramway Acts last session—certainly the London County Council and the Croydon Acts—provisions were inserted to the effect that, where there was any interference with the mains of the Water Companies, the Companies were entitled to carry out the work themselves. In the case of the County Council Bill, this was not obtained without a fight. The provisions were inserted after opposition; and this showed that the Act of 1870 was not complete in the protection it afforded to water companies. His clients, he submitted, ought to be entitled to go before the Select Committee to show why they should be allowed to do themselves, in connection with their mains, whatever work was necessary in consequence of alterations to be effected under the Bill. As to the New River Company, they were part owners of the Staines reservoirs, and had obtained power to carry an aqueduct from Hanworth to Cricklewood. The proposed tramways would cross this aqueduct; and the Company maintained that they ought to be heard before the Committee to secure their proper protection with regard to the carrying out of the authorized plans and sections, and that which was not within the purview of section 30 of the Act of 1870. This brought him to the question of the apprehension of electrolytic action on water-mains. In 1898, Lord Cross presided over a Select Committee of the two Houses of Parliament which dealt with the question of generating stations; and in consequence of certain evidence given by Sir William Preece, the Committee expressed the opinion that the difficulties of working tramways under the trolley system should not be lost sight of. This system was the one to be adopted under the Bill—or, at any rate, it might be. The Committee drew special attention to the recommendation that there should be a strongly-worded clause adopted for the protection of water companies. It was obviously a matter of the gravest importance. It was absolutely necessary to prevent electrolytic action; and this being so, his clients, as the owners of water-works which might be affected, were entitled to see that the clauses which might be inserted in the present Bill were sufficient to prevent such action, or, in the alternative, to give them a remedy in the shape of compensation and so forth, in the event of electrolytic action which could not be prevented.

Sir CHANDOS LEIGH: Where are there any clauses in this Bill referring to electrolytic action?

Mr. BAGGALLAY said that the matter was dealt with by reference to the London United Tramways Act of 1899, and the incorporation, by section 21 of the present Bill, of section 12 of the Act of 1899. He was entitled to go before the Committee to see that he got absolute protection, or the best protection possible, against electrolytic action.

The CHAIRMAN: Do you say you have outgrown the model clause of the Board of Trade?

Mr. BAGGALLAY; I say that the fact of its being a model clause should not prevent me having the matter investigated before the Committee.

Mr. BALFOUR BROWNE, K.C. (for the promoters): Is it not sufficient for you?

Mr. BAGGALLAY replied in the negative. Even if it were sufficient, however, that would not, he contended, preclude him from his right to be heard before the Committee.

The CHAIRMAN: I do not see what is the use of model clauses unless it is to prevent a great many people coming here.

Mr. BAGGALLAY said the objection of the promoters to his being heard was based on the argument that section 12 of the previous Act was sufficient. He submitted, however, that it was not sufficient.

The CHAIRMAN: Why are not the model clauses enough for you?

Mr. BAGGALLAY: It is a question of merits. The clauses are not enough.

The CHAIRMAN: Did you get *locus* against section 12 of the 1899 Act?

Mr. BAGGALLAY: We did not petition.

The CHAIRMAN: It did not affect you?

Mr. BAGGALLAY said it was not so long since the question of the insertion of these clauses first arose. The electric tramway was a new institution. It was hoped that, soon after the adoption of electric tramways, they would get a knowledge of the effect of the working under different systems. The effect was not yet proved.

The CHAIRMAN: You did not come to Parliament when section 12 was adopted.

Mr. PEMBER (for other petitioners): Speaking for my clients, we overlooked it.

Mr. BAGGALLAY said the Lambeth Company did come to Parliament in 1899; and they secured a clause in the London County Council Act providing expressly for compensation in the event of their being able to show that the electrolytic action was due to currents escaping from the tramway. This clause was put last session into the South Wales Electric Power Bill.

The CHAIRMAN: That goes beyond clause 12 of the Act which has been referred to?

Mr. PEMBER: Yes.

Mr. BAGGALLAY: The House of Lords have followed that precedent, but not this House. The London County Council, in their Electric Power Bill of this session, have, however, put the clause in voluntarily. The present Bill incorporates part of the Tramways Act that it is important to the promoters to include; but other portions they do not incorporate.

Mr. BALFOUR BROWNE: We incorporate clause 30 of the Tramways Act of 1870, twice over—out of abundance of caution.

Mr. BAGGALLAY said section 55 provided that the promoters should be responsible for all injury done by act or default; but it only gave rights to damages from the promoters in respect of matters within the immediate purview of the Tramways Act of 1870. It was in the nature of a penal section, but would only penalize the promoters in respect of wrongdoing that arose in carrying out the provisions of the Act of 1870. The provisions of section 22 were not within the purview of that Act. If they were, the promoters would not have to say that the provisions of that section "should be deemed to be works of the tramway subject to the provisions of section 30 of the Act of 1870." Was it not obvious that the questions to be determined under section 55 of the Bill were such as could only be found out before the Committee on merits? The Water Companies considered the issues very important. They thought that the questions now arising should be thoroughly thrashed out, particularly that of electrolytic action.

Mr. PEMBER then argued in support of the *locus standi* of the West Middlesex and Grand Junction Water Companies. He said the petitions of his clients raised the same points as were raised by the other Water Companies—namely, the power taken under the Bill for altering the levels and widening the roads which the Water Companies alleged would interfere, or might interfere, with their mains, and the question as to electrolysis. In addition to what Mr. Baggallay had said as to the first of these points on clauses 22 and 55, the provisions of the Tramways Act could only refer to matters which the Tramways Act contemplated. Therefore, when they *en bloc* incorporated in a fresh measure the Tramways Acts, this incorporation only held good in regard to works contemplated by the Tramways Acts. The Water Companies argued that there were also contemplated in this Bill works such as were not contemplated when the Act of 1870 was passed—the trolley system of traction, for instance. Clause 22 referred to these extra works—dealing with the power to erect posts and so forth; and it went on to say: "And all works to be executed by the Company in pursuance of the powers of this section shall be deemed to be the works of the tramway subject in all respects to the provisions of section 30 of the Tramways Acts." This was tantamount to saying that, but for these words, the works would not be subject to the Tramways Acts. They were not so subject. They were new works which were not dealt with in section 30 of the Act of 1870. At any rate—looking at the matter in a light most favourable to the promoters—it could not be said that there was not a reasonable doubt in the matter; and if there was a reasonable doubt, the petitioners were entitled to *locus standi*. They had a right to go to the Commitee to see the doubt removed. As to the

electrolytic question, last year on the Airdrie and Coatbridge Water Bill a similar point to the present was raised. He (Mr. Pember) appeared for the local Water Company, whose *locus standi* was objected to. The promoters contended that they were protected by the Act of 1870 and the model clauses recommended by Lord Cross's Committee; and the Referees disallowed the *locus*. His (Mr. Pember's) contention was that no recommendation of a Committee, and no regulations of the Board of Trade drawn up in consequence of the recommendations of a Committee, ought to oust the right of a petitioner to appeal to Parliament if he thought fit. He insisted on his right to go before Parliament and ask to have protection against the operation of a particular Bill. The Referees had decided against the position he was taking up; but he asked them to reconsider their decision. Electrolysis was a new risk. Last year the Lambeth Company got a clause from the London County Council in the House of Lords, to protect them against electrolysis though it was refused in the House of Commons; and this year, in the Sheffield Water Bill, the House of Lords had inserted a similar clause, though in the Commons such a clause had been refused in the case of the Kent Water Company, who petitioned against the Bexley Tramways Bill. They had two decisions in the House of Lords in favour of giving the clause; and in the Commons they had two decisions against giving it. But as to the refusal of the House of Commons in the first of the two cases, there was this set-off—that they subsequently acquiesced in the decision of the House of Lords, passing the Bill without amendment. The result was that the London County Council adopted the provision in their perfected Act; and, more than that, they had put it into their new Bill this year. The London County Council now said in their Bill that, if it could be proved that any damage or injury should have resulted from fusion or electrolytic action caused by electricity generated by the Council, nothing in the Act should relieve them from responsibility for the damage. It was clear that, since the Referees had given their decision last year, the London County Council Bill had been fought out without objection to *locus standi*. He did not say that the protecting clause should be put into every Bill dealing with electric tramways. He was ready to admit that there might be different circumstances in different cases; but he submitted that the question was one to be decided on the merits by the Committee, and not on *locus standi* before the Referees. It would be in the highest degree inconvenient and impolitic to allow the two Houses to be divided on a question of principle in the matter of *locus*, which was a very different thing to the question of merits. Having regard to the growing knowledge in this matter of electricity, and the danger arising from it to water-mains, he asked the Court to consider the matter *de novo*, and say that every case should stand on its own merits.

Mr. Greene asked whether the contention of the learned Counsel as to electrolysis was that it should be determined before that Court or should always be left to the Committee as a matter of merits.

Mr. Pember said he would rather not embark on a general proposition, but thought this class of cases should be left to a Committee.

Mr. Greene: The decision of the Court last year looks as if they thought it fell within the domain of *locus*.

Mr. Pember: Yes.

Sir Chandos Leigh: The decision was based on the facts that we had not the same amount of knowledge as we have now, and that we thought the model clause framed on the recommendation of Lord Cross's Committee enough.

Mr. Balfour Browne, with regard to the alteration of levels, said it was always the case that where tramways were constructed the promoters had to alter the levels or widen roads at the instance of local authorities; but that was done, not as substantive work, but only incidentally. In the Airdrie and Coatbridge case, the contention, which was upheld, was that by sections 30 and 32 of the Act of 1870 ample protection was afforded; and he maintained that there was no reason for altering this decision in the present case. If the Act of 1870 was not sufficient, Parliament should alter the general law, and pass another Tramways Act. With reference to electrolytic action, his friends seemed to think that a great deal had happened since the Court gave their decision last year; and they argued that every case must stand on its own merits. If this were made the rule, they would sweep away Joint Select Committees altogether. Last year everything with regard to electrolysis was known which was known now. The gas and water companies argued the whole matter before Lord Cross's Committee, with the result that the Committee came to certain conclusions, subject to the very important provisions in the model clause which was drawn up. His learned friend had not told them the whole story with regard to what happened before the Committees. The London County Council were not going to operate their tramways by overhead wire, but by the conduit system; the present Company would probably use overhead wires. But whatever the system, it had to be approved by the Board of Trade. The decision in the London County Council case was not in favour of the present petitioners, because the system proposed there was different from what was now suggested. He agreed that the Sheffield case in the House of Lords was against him; but if the Court were to be guided by that, why were they not also to be guided by what the House of Commons did in the Croydon and Bexhill cases? Nothing had happened since the last decision of the Court to lead them to alter that decision. Perfect protection was provided in the Bill. The promoters were to use insulated returns; and the electrical power was to be used only in accordance with the Board of Trade regulations. In these regulations there was to be provision for preventing fusion or injurious electrolytic action of, or on, gas or water pipes or other metallic pipes, structures, or substances, and for minimizing as far as was reasonably practicable injurious interference with the wires or apparatus of other parties. This was the general clause which was discussed before Lord Cross's Committee, drafted by the parliamentary draftsman, and inserted in every Tramway Bill; and the Board of Trade had full power to make further regulations if necessary, and so to prevent the very thing the Water Companies now feared. If the Court came to the conclusion that there was a clause in the Bill which gave the Companies full protection (which there was) they would not allow them to go on and ask for anything more.

The Chairman: What is the meaning of the words in your objections to Chelsea—"Except as regards the said alteration of levels?"

Mr. Balfour Browne: They have got in by mistake. But they are there; and I cannot get away from them. Therefore I will concede them *locus* against clause 10, and so much of the preamble as relates thereto. Clause 10 is as to the alteration of levels.

The Chairman, in announcing the decision of the Court, said: In regard to the interference with mains and widenings, the Court hold that the general law gives sufficient protection; but in the Chelsea case we allow the *locus* against clause 10 that has been conceded. In regard to electrolytic action, the Court consider that, under the circumstances of this case, it should be left to a Committee to say whether the petitioners are sufficiently protected; and therefore we allow *locus* in respect of the necessary clauses.

LEGAL INTELLIGENCE.

HIGH COURT OF JUSTICE—KING'S BENCH DIVISION.

Saturday, June 8.

(*Before the* Lord Chief Justice of England.)

Pinner Gas Company, Limited, v. Carew.—Question as to an Agreement being Assignable.

This was an application under Order 14. The defendant in the case—Mr. Frank Murray Maxwell Halliwell Carew—was in 1888-9 the owner of very considerable property at Northwood, Middlesex, near the Pinner Gas-Works; and the action was brought to recover £187 10s. No question was raised as to the amount; the only point was as to liability. In 1888, Mr. Carew was developing and laying out for building purposes estates at Northwood; and he was desirous of having the houses then being erected, or to be erected, there lighted by gas. He therefore agreed, through his solicitors and agents, who acted for him, with Messrs. C. & W. Walker, who were predecessors of the plaintiffs, and carried on the works under the name of the Pinner Gas Company, that if they would lay down mains in certain roads on his property, he would pay them interest on the capital outlay. The interest was to be 7½ per cent., reducible on a sliding-scale, according to the quantity of gas consumed. There were three agreements—one made on March 6, 1888, and the others on Jan. 8 and 9, 1889. These were entered into on the defendant's behalf by Mr. Robbins, of the firm of Messrs. Robbins and Billings, who held a power of attorney for the management of Mr. Carew's property, he being a great deal abroad. Certain payments were made under these agreements; but the defendant now refused to pay, and raised various defences—the principal one being that the agreements in question were not assignable, and that, therefore, the present plaintiffs had no title to sue. One question raised was as to the validity of the power of attorney; but his Lordship pointed out that this would fall to the ground if payments under the agreement, with the knowledge of the defendant, were proved.

Mr. Groser appeared for the plaintiffs; Mr. Heber Hart represented the defendant.

Mr. *A. J. Norris*, of the firm of Messrs. Norris and Norris, solicitors, who acted for the defendant from 1890 or 1891 until recently, gave evidence that he had on three occasions paid cheques either to Messrs. Walker or their solicitor on the defendant's account in respect of the agreements referred to.

Mr. *F. A. West*, clerk to the Pinner Gas Company, also gave evidence as to the amounts due.

Defendant was called, but his evidence simply amounted to an admission that he knew nothing about the matter, but left it entirely in the hands of Mr. Robbins. He said he believed he was shooting in Africa at the time the agreements were signed.

In reply to his Lordship, witness said he had no doubt that he had seen the accounts sent in by Mr. Norris containing the items debited to him of payments made to the Gas Company.

Mr. Heber Hart, having argued at some length the question of the assignability of the contract, and cited several authorities,

The Lord Chief Justice, in giving judgment, said he had listened with great attention to the very able argument of Mr. Hart, but he could not accede to it. The real contract was one to lay down mains; and the amount which the defendant was to pay was interest on the cost, reducible in his favour according to the quantity of gas supplied. For a time he was rather impressed with the argument of Mr. Hart that, inasmuch as there was an obligation to supply gas, and the defendant had an interest in good gas being sent out, the case might come within the principles of some of the authorities which decided that, under such circumstances, the contract was not assignable. But, upon consideration, he did not think this was the true view. The agreement was made by two gentlemen of the name of Walker, who were carrying on business as the Pinner Gas Company, under the powers of a Provisional Order. Mr. Carew, wishing to develop his estate, made an arrangement that they should put down mains and supply gas; he guaranteeing 7½ per cent. on the outlay, reducible in certain events. Under these circumstances, he (his Lordship) was clearly of opinion that *primâ facie* this was an assignable agreement. The other points raised were really not seriously argued. There must, therefore, be judgment for the plaintiffs.

Steam-Rollers and Gas-Mains.

At the Pontefract County Court last week, his Honour Judge Raikes gave judgment in an action brought by the Knottingley Gas Company against the Pontefract Rural District Council for £9 5s. 11d., for damage caused to their main at Ferrybridge, and consequent leakage of gas. Mr. Joshua Scholefield appeared for the plaintiffs; Mr. C. Lowden represented the defendants. It was stated that immediately after the Council's steam-roller had been at work at Ferrybridge, an escape of gas was detected; and on the main being laid bare, the pipe was found to have been punctured. For the defence, it was argued that had the damage been caused by the steam-roller the pipe would

have been crushed and fractured instead of being punctured, as with a pick. It was contended that the pipe had been laid through defendants' drain without their knowledge, had been subject to the action of the elements, and had gradually corroded. There was, moreover, no evidence to show that the steam-roller caused the damage, which might with equal justice have been attributed to any of the road engines which regularly passed over the spot. His Honour said that, whatever might have been the condition of the main (the damaged section of which was produced), when laid some forty years ago, no one would say it was fit for its purpose at the time the damage was discovered. If the plaintiffs had taken reasonable care of their pipe, subject as they must have known it to be to the corrosive action of the water passing through the drain and over its surface, they would have discovered the weakness, and the accident probably would not have happened. They had thus been guilty of negligence; and he did not think they ought to be allowed to recover from defendants. Mr. Lowden asked for costs on the higher scale; but his Honour refused the application.

Private v. Public Suppliers of Electricity.

At the Bradford County Court, last Tuesday, before his Honour Judge Bompas, an application was made on behalf of the Fleece Mills Company, Limited, of Keighley, for permission to alter their Articles of Association. Mr. R. Watson, who appeared for the Company, said they were the owners of mills and other premises in the centre of Keighley, and they had power to supply gas both as an illuminant and for motive power. They now wished to have their Articles so altered as to enable them to supply electricity for the same purposes. Mr. T. R. D. Wright, who opposed the application on behalf of the Keighley Corporation, contended that by a strict interpretation of the Articles the Company were entitled to supply gas to their tenants only. In seeking power to supply electricity, they contemplated supplying others as well; and this would create a new business entirely. In giving judgment, his Honour pointed out that there was nothing to prevent the attainment of the object desired by the Company if they wound up the present concern and formed a new one; and he could not understand how the interests of the Corporation could be affected by allowing the Company to do the same thing by the simple and easy process of altering their Memorandum and Articles of Association. As for supplying electricity to persons other than their own tenants, they would have to get special powers to pass under streets; but there was no reason why they should be prevented from applying for such powers. He therefore sanctioned the proposed alterations.

Charge of Theft from a Prepayment Meter.

At the Worship Street Police Court, last Tuesday, before Mr. Cluer, Charles Selby, 18, described as a labourer, was charged with stealing from an automatic gas-meter at 49, Brady Street Buildings, a sum of 3s. 1d., belonging to the Commercial Gas Company, and also with damaging the meter. Mr. Frowd Phelps (for Mr. C. V. Young) prosecuted. The evidence of a lad named Wolfstein, living in the same buildings, was to the effect that at eleven o'clock on the previous night, when he was standing with a companion at the gates, he saw the prisoner enter and go to one of the blocks. Following him, he heard a breaking sound in one of the recesses where the gas-meters were fixed. Opening the door of the recess, the prisoner was found inside with the drawer of the meter in his hand, putting the money into his pocket. The witness pulled Selby out and took the drawer from him, and the prisoner gave up 3s. 1d., saying he had taken it because he had been eight weeks out of work. He was then given into custody. The meter was found broken open; the damage being put at 5s. The Magistrate said that to prosecute for the damage as well as the felony was like a double punishment for one offence. He had never heard of a housebreaker being prosecuted for breaking the window which gave him access. The prosecution withdrew the charge of wilful damage, and the prisoner was remanded on the charge of stealing.

Batley Corporation Gas Finances.—Speaking at the monthly meeting of the Batley Town Council, the Mayor (Alderman J. Blackburn), who is Chairman of the Gas Committee, expressed regret that the annual financial statement in regard to the gas-works was not quite so satisfactory as usual; this being due to the increased price of coal which had obtained. However, he was able to state that, in addition to handing over, according to custom, the handsome sum of £2000 in aid of the general rates, the works had made a profit of nearly £700. During the twelve months, there had been paid for coal £2948 more than the amount expended last year. He thought the Committee had reason to congratulate themselves upon the state of the finances, especially when it was remembered that they had declined to increase the price of gas.

Loughborough Gas Supply.—At the meeting of the Loughborough Town Council on Monday last week, the Gas Committee presented a report on the working of the undertaking during the past nine months, which showed a profit of £3882. In moving its adoption, Alderman Bumpus remarked that in the twelve months when the concern belonged to the Gas Company they made a profit of £3600. To achieve the result that had been obtained, the Gas Committee had not starved the works. Anyone who saw them before they were taken over would agree, and the figures would show, that they had spent more in maintenance than their predecessors. While the price of gas had been raised, the extra charge they had to pay for coal was larger than the amount realized by the increased price of gas. They had been able to make a greater profit by securing unexpectedly good prices for their residuals; the sale during nine months amounting to £4074. During the previous twelve months they had produced £2961. About £3000 of the profits would be absorbed in interest, and instead of placing the balance to the credit of the sinking fund, it would be carried forward, as possibly they might not do so well next year. He thought the Council might congratulate the Manager (Mr. E. Onions), as the Committee had done, on the successful result of his labours. He had shown zeal, ability, and energy during a difficult time. The report was adopted.

MISCELLANEOUS NEWS.

A VISIT TO THE MIDLAND IRON-WORKS.

A group of gentlemen, numbering about 24, alighted from a train at Newport (Salop) shortly after one o'clock last Wednesday afternoon; and were met by Mr. J. F. Wright and Mr. Alfred Featherstone, the Chairman and Managing Director respectively of Messrs. C. & W. Walker, Limited, of the Midland Iron-Works, Donnington. The little party were there by the invitation of the Directors of that concern, which has grown, by energetic cultivation, from the small seedling of half a century ago to a flourishing tree, upon which those who nurtured it in the past could look without self-reproach, and those who are tending it to-day may and do regard with pride. The visiting party was constituted chiefly of gentlemen who have the administration of two or three neighbouring gas undertakings—mostly Corporation Committeemen. There was the genial Alderman C. H. Wright, the Chairman of the Stafford Corporation Gas and Electricity Committee, whose reception—munificent as it was hearty—of the Midland Association in the closing days of Mr. J. Ferguson Bell's management in that town is still a refreshing memory Then there was Mr. F. Geen, who sits at the head of the body that directs the affairs of the Stoke Corporation gas undertaking; and Mr. Featherstone's numerous gas engineering friends were represented by four whose works are within an easy journey. The object of the visit was, as our title will have shown, the inspection of Messrs. C. & W. Walker's works; and this treat had its origin in an oft-expressed—and perfectly natural—desire of some of the neighbouring rulers of gas undertakings to witness the processes by which that wonderful element of Nature iron is transformed into the plant which so largely aids them in the production and storage of one of the daily necessities of the communities whom they serve. At Donnington, their curiosity was amply gratified.

The Midland Iron-Works are situated in the midst of lovely country; and studded around them, in trim gardens, are small reposeful habitations, which are mostly occupied by the staff and workers of that huge establishment. But as yet the prosperity of the concern has not raised in the immediate neighbourhood a sufficient population to need a hostelry of a size adequate to the entertainment of a number of travellers. This is a deficiency which may well be left to a remote future. But as it exists to-day, the hosts last Wednesday, before taking their visitors from the more frequented ways of men, invited them to luncheon at the Victoria Hotel, in Newport. No more time, however, than was necessary for their refreshment was spent there; and an hour after their arrival found them seated in carriages, and on their way to Donnington. Leaving (to the eye of the city man) the quaint old streets of Newport, the party soon found themselves traversing most diversified scenery, whose beauty and verdant dress were refreshing to those of the visitors whose daily tasks set a bar to such frequent pleasure. *En route* Mr. Featherstone revealed himself in a new light. His interest in matters engineering, it was found, is quite equalled by his admiration for the beautiful in Nature. He pointed out the most charming views; and once he ordered the coachmen to stop at a particular point, which he knew well, and where the visitors had before them a majestic landscape, with the Wrekin for a background on the right and Lilleshall Hill (capped by a monument to the first Duke of Sutherland) away to the left.

Driving on, the party arrived at the works. Big and productive as they are, and affording the means of livelihood to so many, one can hardly restrain a feeling of regret that they were originally planted in the midst of so much natural grandeur. And yet when one comes to examine the points for and against their situation, the former appear to out-weigh the latter for reasons beneficial to the concern itself and to a goodly number of our fellows. Taking the latter view first, the position of the works removes from them the charge of contributing in any way to the pollution of the air and to the wearing and wearying tumult of our busy manufacturing centres; and it keeps within pure and healthy surroundings several hundred workers who otherwise might be condemned to residence in the closely packed and unhealthy quarters of the less fortunate denizens of many of our industrial towns. The village of Donnington almost owes its existence to the Midland Iron-Works. Most of the cottages and houses have been erected there expressly for the accommodation of the staff and workpeople; and the liberal provision which has been made for instruction and wholesome pleasure found birth in the brains, and development in the liberality, of the immediate past chiefs of the firm whose names give to it its title. Their work in this direction alone would in Donnington and the neighbourhood form a sufficient and lasting memorial. Then, as to the suitability of the position from the business point of view. The founders of the works—Messrs. Charles and William Walker—knew well what they were about when they selected the site. It is connected by sidings with the London and North-Western and the Great Western Railways, and the Shropshire Union Canal affords an alternative means of conveyance. There is to-day a perfect system of railways throughout the vast works; each department boasts its own narrow-gauge lines; and the whole of the traffic is worked by the firm's own locomotives. Then, again, the works have within easy reach the sources of the raw material and fuel used in the vast operations of the works. Therefore, in this case sentimentalism must succumb to utilitarianism.

Before passing on to other points which struck the visitors last Wednesday, let us stop to introduce a few general particulars. The works, which were first established from forty to fifty years ago, extend over fully 15 acres of ground, of which more than half is under cover. Men and boys to the number of 700 are employed on the works; and some 300 are distributed in different parts of the country and abroad engaged in the erection of plant. The wages paid in the course of a year amount to something like £36,000; and about £4000 is paid to the railway companies for the carriage of material to and from the works. Roughly, the yearly turnover is £150,000 worth of work, and this mostly represents gas plant. The firm, it was seen, has a large amount of work now in hand, and a great deal, it was gathered, in prospect. So that,

remembering that this is only one firm out of many, a critic of the gas industry would be suffering from very defective mental vision if he could see in this any trace of decadence. When this one concern commenced, half an acre of land, a dozen men, and a moderate weekly cheque, met the needs of the time. Look on that picture, and then on the one presented to us to-day. What we see there is merely the reflection of that great development which the last half century has witnessed in the larger industry of gas supply.

But to return again to the general description of the works. They are divided into large erecting-shops, boiler-shops, pattern-shops, wood-mill, and foundry, each and all of which are fitted with modern steam and hydraulic machinery. The shops are all closed in; and the physical comfort of the workers in the winter has been studied by the provision of a system of steam-piping. The firm engage in the construction of gas plant, chemical plant, bridgework, roofs, and structural iron and steel work generally; and to readers of the "JOURNAL," it is almost superfluous to say that, among their specialities, are gasholders (from the 10 feet holder up to the Goliath of 300 feet in diameter), purifiers, valves, and sulphate of ammonia plant. It was seen, by the way, that of gasholders several are in hand for works both at home and abroad. With regard to purifiers, it may be mentioned, as a point of interest, that the firm may take to themselves the credit of having been the first to introduce the system of planed joints, which are now so generally adopted. Speaking of work being done abroad reminds us of a remark made by Mr. Featherstone during the visit on Wednesday in a little chat on foreign competition in the engineering trade. He stated that the firm have constructed work in such far distant and separated climes as North and South America, Australia, and Africa, lately at Sydney and Santiago, and in Norway and Sweden; and the contracts were secured in competition with foreign firms. And be it again remembered that this is only one of our great English firms in the same line of business. Mr. Featherstone laughs to scorn the mere suggestion that Continental and other foreign manufacturers can turn out work superior to the British manufacturer, backed up by the skill of the British working men; and few would care to dispute him when he stands in the midst of his men and the results of their labour at the Midland Iron-Works. He deplores, and we sympathize with him and others in, the unfairness of the competition with the Continent on the score of the excessive duties with which goods sent into European countries are burdened. In Germany, for example, the rate of duty is equal to £3 per ton; while German manufacturers can import their products here absolutely free of any exterior charge. Small wonder that our manufacturers feel strongly on the point!

We have been digressing, and must return to the visit. The Chairman of the Company (Mr. Wright) and Mr. Featherstone were heartily assisted in piloting the visitors safely through the mazes of the various shops by the Assistant General Manager and Engineer (Mr. H. Howell). We say "safely," for throughout the works they were turned from any direct course by the profusion (we were nearly writing "confusion") of the machinery in motion, work in progress, work receiving the final touches before being sent away to service, wood, pipes, materials, shafting, moulds, cranes, workmen, caldrons of molten metal, and other animate and inanimate objects of indescribable shape, size, and number. Besides all this, the interest of the great and busy scenes wherever one turned, was varied by the activity one had to display here and there in dodging myriads of flying, sportive sparks, and the exercise of care in preventing any involuntary contact with moving material and newly painted goods. First, the party were taken to see the huge cupolas, and the raw material with which they were fed. Then down into the casting-shop, where some eighty men are constantly employed variously in the delicate task of making moulds, hauling and conveying the golden liquid metal from the cupolas to different parts of the works, making the castings, and so on. The shop is equipped with half-a-dozen ponderous steam-cranes for lifting the huge caldrons, which contain 2 tons of the molten metal, at from 2000° to 3000° Fahr. The work in its progressive stages was explained and executed for the benefit of the uninitiated among the visitors; and the great care with which every operation is performed could not escape remark. Bottom plates of purifiers, cores for pipes, and a standard base (which will weigh 21 cwt. when finished) for a big holder at Southampton, were among the castings made in the presence of the company of delighted spectators.

On the way to the machine-shop, it was noticed that the firm are their own gas manufacturers. Of the machines, those engaged in the planing of two 24-inch slide-valves and retort mouthpiece lids claimed most notice; and then in the erecting-shops, the travelling cranes, some Weck valves, and a sulphate of ammonia saturator chiefly monopolized attention. Farther on the party dropped into the shop where purifier-grids were being made. There they saw the huge trunks of beech trees, and the processes by which they are converted into form suitable for playing a useful part in gas purification boxes. The dexterity with which juvenile workers fit the grids together in the rough was interesting and amusing; but the secret of their activity was explained when it was whispered that they are paid by results. Then in one of the boiler-shops, the operation of making flanges by a machine working at a pressure of 1250 lbs. on the square inch was an attraction. Elsewhere the cutting of huge girders, the squaring of the ends of piers, the rolling of gas-holder sheets, the punching of holes by hydraulic pressure, and the riveting together by the same power of enormous girders and gasholder standards, were all subjects and operations which excited interest and no small wonder. Massive gasholder standards and cups, and condensers, both in the partially finished and complete form, were inspected; and the final object of heed in the nature of work was a section of a holder (182 feet in diameter) which was being fitted together before being despatched from the works.

We have already indicated that a close relationship exists between employers and employed at the Midland Iron-Works. It was clear to the observer on Wednesday, that one of the articles of faith of the former is that a benevolent personal interest in the welfare—physical and mental—of those employed goes a long way in securing fidelity of service and trust. There are to be found among the employees men who have grown grey in the service. Their sons are following them. When the good work of the sires is done, it will thus be carried on, with equal skill, by those who have been reared on the bread earned by their fathers' industry in these works, and who have grown from childhood to manhood under the shadow of the buildings and within sound of the throbbing machinery and the "clang and the bang" of the daily work. At the entrance to the premises, the men have a magnificent dining-hall, capable of seating 500, and fitted with a large gas griller, oven, and steam kettle for cooking the men's food. Hard by is a cycle-shed for the storage of cycles during working hours. And near at hand again is an excellent library, reading-room, and recreation room fitted with a billiard table. The men are encouraged, too, to look upon Mr. Featherstone as their counsellor and arbitrator; and honest dealing and treatment has led to confidence. All these things amid many others were noted by the visitors on Wednesday; and as they drove from the works, they felt that they had seen and learnt much which would be useful in their capacities of administrators of gas undertakings and employers of labour.

The journey back to Newport station was by way of Lilleshall Abbey, and thence (by permission of Mr. Hamilton, the Agent to the Duke of Sutherland) through the gardens and grounds of Lilleshall Hall—the drive agreeably capping a visit full of enjoyment, for providing which the visitors individually thanked their hosts.

A GADD AND MASON HOLDER AT WALKER.

The inauguration of a Gadd and Mason telescopic gasholder took place last Friday, at the Walker station of the Walker and Wallsend Union Gas Company, in the presence of an interested party, invited by the Chairman and Directors. The holder has been constructed with Messrs. R. & J. Dempster's improvements in this particular system of guiding. It is the first holder of the kind in the district, though during the last ten years (so it is stated) upwards of 115 have been built, varying in size up to 150 feet in diameter, and with from one to three lifts. In the present instance, the tank is 82 feet in diameter by 23 ft. 6 in. deep. The outer lift is 80 ft. diameter by 22 ft. deep; the middle lift, 77 ft. 9 in. diameter; and the inner lift, 75 ft. 6 in. diameter. The capacity is 300,000 cubic feet. The erection of the ironwork was begun in January, and finished at the commencement of April; the work being completed within three months. The work in connection with the tank has been carried out by Mr. D. N. Brims; and the ironwork by Messrs. R. & J. Dempster, Limited.

Colonel Crawford, as Chairman of the Company, inaugurated the new holder by opening the valve, when the outer lift began to descend—imperceptibly, perhaps, but surely—into the tank.

After a thorough inspection, the company were entertained to light refreshments, when the Chairman gave the toast of "Success to the New Holder." He said that so far it had worked very satisfactorily. The gas-works in which they found themselves were commenced in 1861. The Company was a very small affair then; and it was not until 1866 that it was incorporated with that of Mr. Potter, at Willington Quay. Since then the works had gone on progressing to such an extent that they had increased the supply of gas from 18 million cubic feet to about 200 millions per annum. To cope with this, they had remodelled the works at Willington Quay, where everything was of the most modern character.

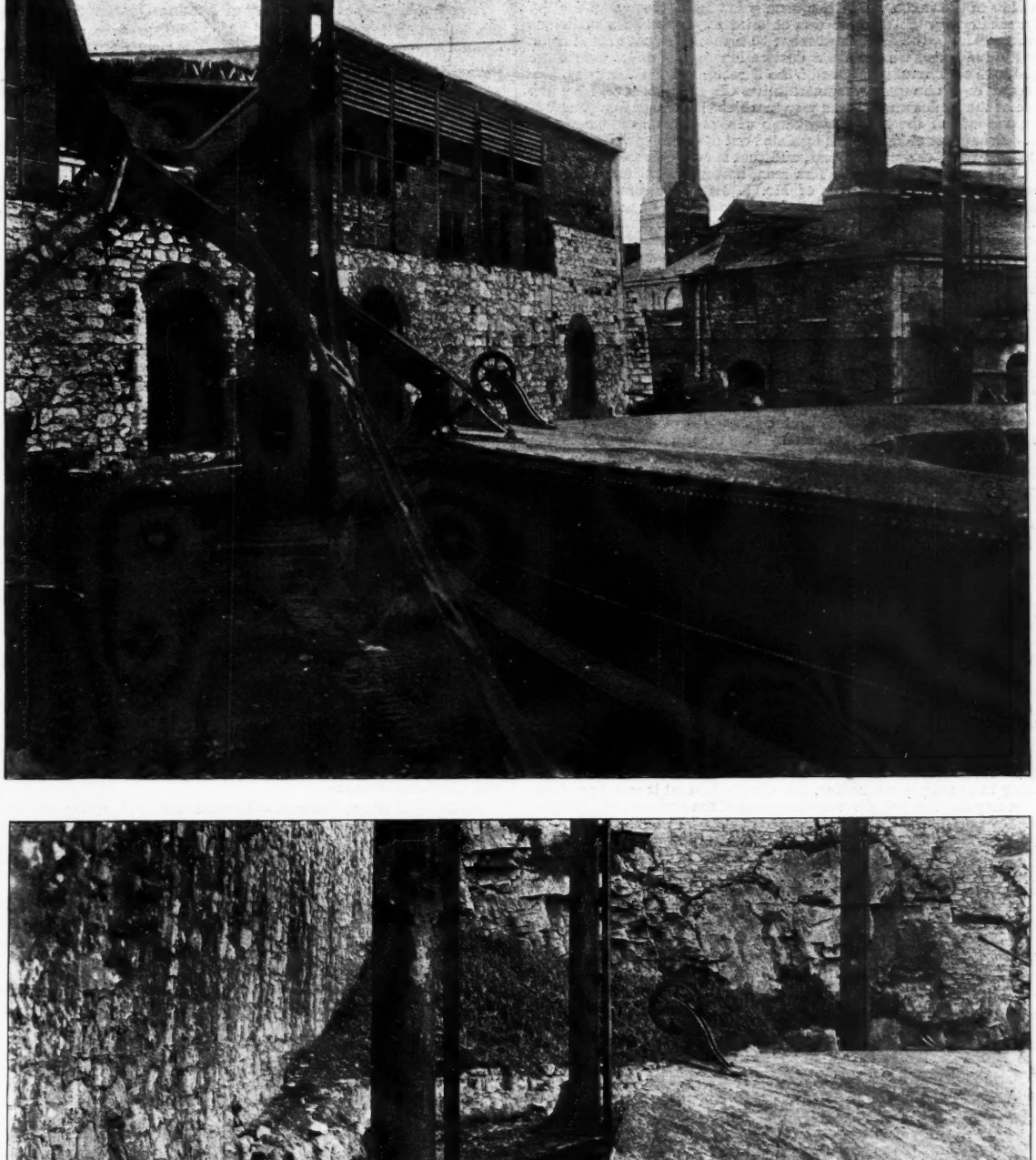
Mr. J. W. Scott, the representative of Messrs. Dempster, in reply to questions, claimed economy combined with safety as the special features of the kind of holder just inaugurated.

A dinner in celebration of the event was given later in the day at the County Hotel, Newcastle—Colonel Crawford presiding. Among the guests were Mr. W. Doig Gibb, Mr. W. Hardie, Mr. C. Dru Drury, and the Engineers of the principal gas-works in the surrounding district. The toast of the health of the Contractors having been acknowledged by Mr. Scott and Mr. Brims, Mr. Gibb proposed—"The Walker and Wallsend Union Gas Company." He said the Company were to be congratulated upon the progress they had made. They were the first to incorporate gas with electricity, and to put themselves in a position to say to the inhabitants of Walker and Wallsend that they could supply them with either illuminant. He thought much credit was due to the Directors for their enterprise, and also to Mr. Armstrong, their Secretary, and Mr. Walker, their Manager. Colonel Crawford, in responding, claimed that the Company had been able to meet the demands of the district as they had arisen, and maintained that, notwithstanding the progress of electric lighting, gas was holding its own. The remaining toast was "The Gas Industry," which was acknowledged by Mr. Hardie and Mr. Drury.

EXPLOSION AND FIRE AT THE CORK GAS-WORKS.

A Gasholder Destroyed.

The news which reached London by telegraph on Monday afternoon last week, that a holder at the Cork Gas-Works had been destroyed by an explosion, as briefly recorded in the "JOURNAL" the next day, was confirmed by fuller details subsequently published. The explosion occurred at a quarter past two o'clock—the report being heard all over the city and suburbs; and its effect was to rend the holder, which contained about 250,000 cubic feet of gas. The liberated gas took fire, and the flames extended in all directions; causing considerable damage to a number of sheds and other structures in its vicinity. The Manager (Mr. M'Grath) ran to the scene, and promptly had all the connections with the mains cut off. As soon as the alarm produced by the shock had somewhat subsided, an attempt was made to ascertain whether any lives had been sacrificed. Fortunately, most of the men were at dinner; but four were found to have been more or less injured. The Fire Brigade were quickly upon the spot; but on their arrival it was discovered that their appliances did not fit the hydrants on the works. They were consequently powerless to do anything to check the fire, which by this time was raging fiercely. The gas was allowed to burn itself out, and the efforts of the firemen were directed to protecting the other holders and the premises in the immediate vicinity of the wrecked



holder. By five o'clock all the gas was exhausted; and the vessel had dropped into its tank—a portion of the guide-framing falling upon the adjacent buildings. The extent of the damage is shown by the two views of the holder, for which we are indebted to Mr. M'Grath.

In view of the strike which has been going on at the works for the past week or two, the disaster was at once attributed to a malicious act on the part of the disaffected men. This was the conclusion come to by the Manager, who made a declaration to this effect before the Magistrates on Thursday. One of the Directors of the Company also expressed to a newspaper representative the opinion that, from the nature of the explosion, and the way in which the ground was ploughed up on one side of the holder, a charge of dynamite must have been used. In support of his view, he pointed out that only a wall separated the holder from the public road, and that it was nearest to the road that the explosion occurred. The men, however, held a meeting on Tuesday, under the presidency of Mr. J. Lane, for the purpose of refuting what they professed to regard as an aspersion upon them. Mr. O'Leary, local Vice-President of the Gas-Workers' Union, repudiated the suggestion that a man would risk his life by going to the holder and throwing an explosive at it. He said he was very sorry that such an accident as that of the previous day had occurred at the gas-works, and he wished the public to know that it was not caused by the hand of any man in the city of Cork, but was simply and purely the result of incompetent persons being employed. Mr. J. O'Gorman, the Secretary of the Union, said the whole matter was one for the fullest investigation by the Board of Trade. The strikers demanded this; and he was sure that the Board would exonerate them, and put the blame on the right shoulders. The strikers would give every assistance in their power at the inquiry. A gentleman who professes to have had a life-long official connection with such occurrences pooh-poohs the idea of an "explosion" having occurred. His theory is that the holder had been over-filled, and that the escaping gas became ignited.

The loss of so much gas in the present critical condition of the Company added to the gravity of the disaster, and caused considerable inconvenience to the citizens on the night of the occurrence. Matters improved, however, on Tuesday, when the supply was better than it had been at any time during the strike. Additional men had arrived, and work was proceeding smoothly. Picketing has been kept up; but the constabulary have prevented any breach of the peace. Practically the whole of the strikers have been replaced. With regard to the injured men, who were removed to the hospital, the most serious case was that of William Barry, who was standing upon a ladder in the immediate vicinity of the holder, and was thrown violently to the ground, his legs being badly injured; but he was the only one who had to be detained. The damage is estimated at £2000.

According to the "Cork Examiner," there was no change in the state of affairs at the gas-works on Friday. The only thing new was that, for the previous two days, Dr. J. G. Curtis, of Cork, had been holding an inquiry, under the Factory Acts, into the cause of the explosion. He had collected all the available evidence, which would in due course be forwarded to the Home Office. Owing to the quantity of water remaining in the damaged holder, Dr. Curtis thought it was impossible to form any definite opinion as to the cause of the occurrence. Writing on Friday night, the Cork correspondent of the "Freeman's Journal" said the public lighting of the city had been fully resumed, but it was "merely a glimmer." At the meeting of the City Council, Alderman Cave inquired what steps they could take with regard to the lighting, as it was a serious thing to have the streets in darkness. He wished to know if there was not a contract between the Corportion and the Gas Company, and whether the Company could not be compelled to carry it out. The Town Clerk explained that there was no contract. The Corporation simply paid for what gas they had, like any ordinary customer. No action was taken in the matter.

GAS AND OTHER BILLS AND ORDERS OF THE SESSION.

The Board of Trade report on the applications for Gas, Electric Lighting, &c., and Water Bills and Provisional Orders for the present session has lately been issued. It shows that the number of Bills relating to the supply of gas is 43, all of which, with one exception, relate to England and Wales. The capital proposed to be raised is £7,877,260—£4,883,900 by shares and £2,993,360 by loans; the latter amount including £201,000 proposed to be authorized for gas expenditure by measures classed among Tramway Bills, and £25,000 by a Water Bill. There are 11 Bills relating to the supply of electricity; two being for Ireland and two for Scotland. The amount of capital proposed is £12,549,332, of which £9,060,000 is to be raised by shares and £3,489,332 by loans; the latter sum including £10,000 proposed to be authorized by a Bill classed as a Tramway Bill. There are 40 Bills relating to the supply of water—all of them being for England and Wales. The proposed capital is £6,572,328; being £623,000 by shares, and £5,949,328 by loans. In the latter there is included a sum of £50,962 proposed to be authorized for water expenditure by a Bill classed among Tramway Bills, and £30,000 by Gas Bills. Provisional Orders to the number of 21 have been applied for in respect of gas and water supply, and 108 in regard to electric lighting schemes—the numbers, curiously enough, being just the same as last year. The capital proposed to be raised under these Orders is: Gas, £542,166; water, £543,750; gas and water, £125,000 (making together £1,210,916); and electric lighting, £1,994,608. Compared with last year, the capital required for gas purposes by Bills is £3,291,574 more, for water supply £17,407,019 less, and for electric lighting, &c., £4,704,166 more. For Gas and Water Orders the capital proposed is £538,916 more, and for Electric Lighting Orders £203,367 more, than in 1900.

The City of Paris has been condemned to pay the Countess de Mont, the owner of a château at Saint Lubin des Joncherets, the sum of £6000 and costs for damage caused by the deviation of the River Avre for the water supply of the city. The plaintiff has entered another action for compensation, on the ground that the lowering of the river caused malarial fever in the district, from which her husband died.

METROPOLITAN GAS AND WATER WORKS ASSESSMENT APPEALS.

At recent sittings of the County of London Quarter Sessions, under the Valuation (Metropolis) Act, 1869, motions were made, with the results stated, in connection with several of the Gas and Water Companies of the Metropolis who had entered appeals from the assessments of their undertakings by the various rating authorities:—

Gaslight and Coke Company.

The following reductions were made, by consent, in the Westminster Union:—

Parish of St. James.—In respect of mains, pipes, &c., gross value from £16,912 to £12,840, and rateable value from £14,094 to £10,700.

Parish of St. Anne.—In respect of mains, pipes, &c., gross value from £5000 to £4182, and rateable value from £4167 to £3485.

South Metropolitan Gas Company.

The following reductions were made, by consent, in the Wandsworth and Clapham Union:—

Parish of St. Mary, Battersea.—In respect of land, gas-mains, and service-pipes, gross value from £7850 to £7175, and rateable value from £5588 to £4750. These values were apportioned by the Court as follows: Battersea, gross £7060, rateable £4707; Streatham, gross £5, rateable £3; and Wandsworth, gross £60, rateable £40.

Parish of Clapham.—In respect of land occupied by mains, service-pipes, and fixed plant, gross value from £8265 to £7500, and rateable value from £6199 to £5000. These values were apportioned by the Court as follows: Clapham, gross £6997, rateable £4664; Streatham, gross £378, rateable £252; Battersea, gross £100, rateable £67; and Lambeth, gross £25, rateable £17.

Parish of Streatham.—In respect of mains, gross value from £10,558 to £9525, and rateable value from £7919 to £6350. These values were apportioned by the Court thus: Streatham, gross £9049, rateable £6032; Battersea, gross £36, rateable £24; Camberwell, gross £19, rateable £13; and Lambeth, gross £421, rateable £281.

The following reductions in the rateable value were made, by consent, in the Greenwich Union:—

Parish of St. Nicholas, Deptford.—In respect of mains, pipes, &c., from £864 to £829.

Parish of St. Paul, Deptford.—In respect of land occupied by mains and pipes, gasholder, buildings, mains and appurtenances, land, cottages, gasholder, and appurtenances, from £8490 to £8107.

Parish of Greenwich.—In respect of mains and gas-works, from £6180 to £5929; and also from £30,000 to £29,500.

Wandsworth and Putney Gas Company.

The following reductions were made, by consent, in the Wandsworth and Clapham Union:—

Parish of St. Mary, Battersea.—In respect of land, mains, and service-pipes, gross value from £415 to £393, and rateable value from £311 to £262.

Parish of Putney.—In respect of land occupied by mains, pipes, and fixed plant, gross value from £2247 to £2059, and rateable value from £1685 to £1373.

Parish of Wandsworth.—In respect of works and fixed plant, gross value from £4614 to £3520, and rateable value from £3461 to £2347.

Chelsea Water-Works Company.

In respect of land, water mains, pipes, and services in the Fulham Union, the gross values were reduced, by consent, from £10,996 and £4 to £8662 and £4, and the rateable values from £8247 and £3 to £6497 and £3.

West Middlesex Water-Works Company.

In respect of mains, pipes, land, and services in the Fulham Union, the gross values were, by consent, reduced from £6548 and £52 to £4293 and £40, and the rateable values from £4911 and £39 to £3220 and £30.

Grand Junction Water-Works Company.

In the case of this Company, who had entered appeals from five assessments—viz., St. Marylebone, St. James (Westminster), St. Mary (Paddington), St. Margaret and St. John (Westminster), and St. George (Hanover Square)—on the application of the appellants, and with the consent of the respondents, a valuation was ordered by the Court to be made, the appointment of the valuer being deferred; and, by consent, the appeals were consolidated.

BIRMINGHAM CORPORATION FINANCES.

The Position of the Gas and Water Undertakings.

At the Meeting of the Birmingham City Council last Tuesday, Alderman Clayton presented the report of the Finance Committee, and proposed that the Council should go into Committee for the purpose of considering the detailed estimates for the borough and improvement rates for the current financial year. He said there was a greater feeling of anxiety in the city now than there had been for some years past with respect to the Corporation expenditure, and it was primarily due to the uncertainty as to the cost of the Welsh water-works, the large amount of the debt, and to the prospects of bad trade in the near future. On the other hand, the reduction of the rates which the Finance Committee announced at the Council meeting in April somewhat tended to allay that feeling; but when the accounts for the past year were made up, it was found that the Committee were a little "too previous," and that there could not be a reduction in the borough rate from 1s. 5d. to 1s. 4d. in the pound as was anticipated. He pointed out at the meeting in April that, compared with 78 of the large towns of the country, Birmingham really occupied a very satisfactory position in

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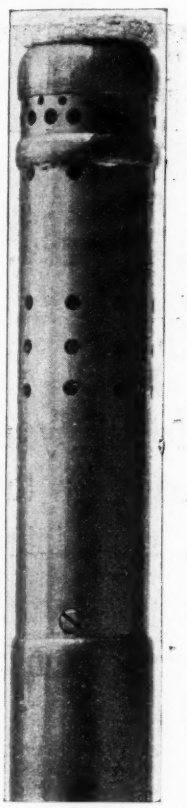

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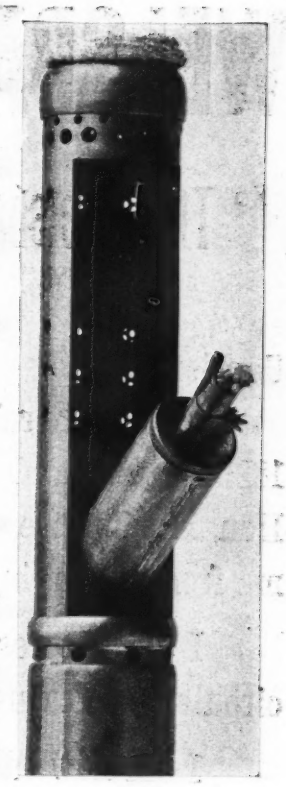

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APOLOGY

FROM A. KRUMM,

FOR INFRINGING THE

WELSBACH 1893 PATENT

30th May, 1901.

To **The Welsbach Incandescent Gas Light Company, Limited,**

78, YORK STREET, WESTMINSTER, LONDON, S.W.

Gentlemen,

I hereby tender my sincere apology for having infringed your 1893 Patent, and having treated with contempt the order made by the Hon. Mr. Justice Channell, dated the 6th day of March, 1901, restraining me from infringing such Letters Patent.

I also express my regret for having distributed untrue and misleading circulars referring to your action against me.

I am now satisfied that the

INCANDESCENT MANTLES WHICH I SOLD

at the time the Action was commenced, and also after the Injunction was granted against me

(AND FOR THE SALE OF WHICH I WAS COMMITTED TO PRISON)

ARE INFRINGEMENTS OF YOUR 1893 PATENT.

I undertook the sale of the last-mentioned mantles through the misrepresentations of Mr. T. Butterweich, of Berlin, and I undertake to take immediate proceedings against T. Butterweich.

You are at liberty to publish this apology in whole or in part in such manner as you may think fit. Yours faithfully,

(Signed) **A. KRUMM.**

regard to its rateable value per head of the population. In 1871 it was £3 10s.; and now it had gone up to £5 5s. per head, or an increase of 50 per cent. in thirty years. This he thought would be considered satisfactory, as it showed that Birmingham was not going behind. The debt on the community was now the second largest outside the Metropolis. Manchester took the "first prize" by reason of its expenditure on the Ship Canal; but, so far as he could see, Birmingham was not likely to equal Manchester in the amount of its debt. The debt in Birmingham a year ago was £10,700,000, which was the net amount to be provided for by the Council; and this year it was £11,700,000. But Manchester appeared to owe about £4,500,000 more than Birmingham did. Roughly speaking, he supposed they might put down as their present requirements £1,500,000 to £1,750,000 to complete the water-works, £250,000 for gas, £250,000 for the lunatic asylum, and other sums, bringing up the total to about £3,500,000 yet to be borrowed. But it was not altogether the amount of the debt that people thought so much about as what it actually cost them; and, therefore, in talking of such large figures, it was not the practice, from the ratepayers' point of view, to take into consideration the capital invested in industrial undertakings, such as the gas, water, and the electric light. So far, none had been sources of expense to the city, while some had been profitable. It was distinctly understood that the water-works should never be a source of profit; the markets used to yield something like 1d. rate, but the large extensions had practically absorbed the whole of the profit; and he was afraid, if the prospects of the Gas Committee next April were as bad as they were last, the Council could not expect the £30,000 they had taken credit for in making the rate for this year to be paid, and there would have to be a substantial addition to the improvement rate if the finances of the Gas Department did not improve. With regard to the Water Department, the Council would remember that when the Bill was before Parliament, the forecast showed that until the water-works were opened the increase in the charges would be such that there would be a considerable accumulation in hand, and after they were opened the revenue would not be sufficient for some years to pay the working expenses, and there would be a certain deficiency. It was perfectly clear now that this forecast would turn out to be much worse than was anticipated, and the time was approaching when there must be an increase in the water charges, a rate-in-aid, a suspension of the sinking fund (he did not think this would help them very much), or a huge deficit carried forward. In the course of further remarks, he stated that if the ratepayers would get acclimatized to the fact that for the next few years they would have to pay 3d. or 4d. more in the pound on the rates, they would not be far out.

FENTON (STAFFS.) GAS SUPPLY.

The Past Year's Working.

The Chairman of the Gas Committee of the Fenton Urban District Council (Mr. J. Shenton) made a statement, at the last meeting of that body, on the subject of the progress of the gas undertaking in the past year. He began by referring to the changes which had been made in the management of the works, and expressed his pleasure that since then there had been unbroken progress. Eighteen months ago, the works presented anything but a satisfactory appearance. The purifying plant was altogether inadequate, the condenser was perfectly useless, and the retorts had got into such a condition that the Committee had to renew most of them, and the buildings were in a state of dilapidation. All this had been changed. They had extended the purifying plant; they had overcome the difficulty, at all events for the present, with regard to the condensers; a great portion of the retorts had been renewed, some part of the building had been rebuilt and brought into a satisfactory condition; and the quality of the gas had considerably improved. The make of gas was 82,343,000 cubic feet; being an increase of 2,061,000 cubic feet, or at the rate of 2·56 per cent. for the year. The unaccounted-for gas was at the rate of 10·9 per cent., a decrease of 0·69 for the year. The gas-rental showed an increase of £2137, including £2108 from private consumers. On the residuals account there was a rise of £1375 for the year. The additional cost of manufacture was £1369, and of coal £1918. The decrease in purifying materials and wages was £323; in carbonizing wages, £246; and in the cost of the repair and maintenance of works, £20. The diminished cost of distribution was £226. The increase in the rates and taxes was £19. The amount written off as bad debts for gas was £108. The gross profits were £5040; and after charging interest £2200, and instalments £753, there was a net profit of £2086 for the year. From a manufacturing point of view, the officials were to be congratulated. Although the quantity of gas consumed did not show any material increase, owing probably to the exceedingly mild winter and the entire absence of fogs, the accounts had come out in a most satisfactory manner. With respect to the profits, Mr. Shenton said it must not be overlooked that the capital was larger than the assets, and it would be the first duty of the Council in some way to create such a fund as would set their capital and assets right in course of time. He would suggest that this year they should put into a fund formed for the purpose a sum of £250, and that they should do this for a period of twenty years, in which time, with interest and compound interest at the rate of 2 per cent., they would have a round sum of £6000. He would further suggest that they should create a reserve fund, and that they should pay into it £200 for five years, so that they would have a sum of £1000. He would still further suggest that they should hand over to relieve the rates the sum of £560, which would be equal to a 2d. rate. Then, if the Council would allow them, the Committee would retain in their own possession £400, to pay for the re-arranging and relighting of the main thoroughfares. They would also have in their hands £300 to pay for the extension of offices, and the remaining £376 it was suggested to carry forward to the working account next year. A cordial vote of thanks was passed to Mr. Shenton for his able and lucid statement, and for the time he had devoted to the affairs of the gas undertaking.

The Hessle Gas Company think that an offer of £12,000 made for their undertaking by the District Council is unworthy of consideration.

CARLISLE GAS COMMITTEE AND THEIR WORKMEN.

The Carlisle Corporation Gas Committee have now come to a final decision with regard to the question of formally recognizing the Gas Workers' Union. Some time ago the employees at the gas-works applied for more wages and better conditions of labour. A desire was expressed that the Committee should receive Mr. Lynas, the local Secretary of the Gas Workers' Union, and hear him with regard to the men's grievances. The Committee declined to receive him, but authorized the Manager (Mr. C. B. Newton) to meet the men. The men refused to do this. The matter was discussed at meetings of the Town Council; and it was urged by one member that the time had gone by for acting in a tyrannical fashion towards workmen. The Committee have now decided to pay time-and-a-half to stokers and enginemen for the full twenty-four hours on Sundays, instead of twelve hours, as hitherto; to reduce the working hours of fitters and labourers from 55½ to 54 hours per week; to increase the wages of lamplighters 1s. a week; and to allow the employees to make representations with regard to any grievances they may have through the Secretary of the Gas Workers' Union, or anybody else, to the Manager, who will report thereon.

NEWCASTLE GAS COMPANY'S NEW SHOW-ROOMS.

Opening Ceremony.

Last Tuesday, the Newcastle and Gateshead Gas Company embarked upon a new enterprise which will bring them into line with a large number of gas undertakings in the country, by formally opening the show-rooms which they have fitted up below their offices in Granger Street, Newcastle-upon-Tyne, where, in future, all varieties of appliances used in connection with gas will be on view. There was a numerous gathering of ladies and gentlemen at the opening ceremony; among the company being the Mayor of Gateshead (Mr. A. Gillies). Tea having been served, the Chairman of the Company (Sir W. H. Stephenson) offered a few remarks as to their intentions. He began by giving an account of the progress made by the Company in recent years, especially in introducing prepayment meters. He said they had already received orders for 2000 in one district at Gateshead; and the Directors thought that by Christmas next 5000 of these meters would be in use in different parts of their area. Since July last they had supplied 1400 cooking-stoves; and altogether they had 4000 of them in different houses. They had about 40,000 consumers; and he hoped they would shortly be able to sell gas, as they once did, cheaper than any other company in England. Going into detail as to what they proposed to show in that spacious place, Sir William said the new branch was to be a permanent one. It would be open all the year round, and additions in the way of new inventions would be made as time went on. With regard to examples of intensified light, they had appliances for streets, large rooms, warehouses, workrooms, and yard lighting, &c. Each of these lights was equal to 300 sperm candles, and the cost was something even less than ¼d. an hour. Another feature of the department would be the giving of advice as to burners, &c. A lady would also be in attendance to advise and inform inquirers as to their cookers, and also in regard to cookery. Appliances would be shown that roasted one's coffee and otherwise prepared it for use, and there was also an arrangement by which infants' food could be prepared during the night. Hotels could be supplied with different kinds of machinery, both large and small, to be worked by gas. The place would truly indicate how useful a servant gas might become when properly understood. The exhibition would be free, and no one would be asked to purchase. Anything that was liked could be bought there, or could be secured from one's own gas-fitter.

COVENTRY CORPORATION GAS SUPPLY.

A Loss on the Year's Working.

The annual accounts of the gas undertaking were submitted at the meeting of the Coventry Corporation Gas Committee last Wednesday. They disclosed a working profit of £9956; and a final profit, after paying all capital charges, and bringing into account the £1496 brought forward from the previous year, of £329, which the Committee recommend should be carried forward. The year's trading therefore really shows a loss of £1167. This is the first time since 1889 that the gas undertaking has not contributed to the relief of the rates. The amount allocated for this purpose in each of the last four years was £4000, besides considerable additional amounts being transferred to the sinking fund. The principal causes of the decline in the gas profits are: (1) The increased price of coal; (2) damage to the works and interference with the carrying on of the undertaking by the flood; (3) heavy expense of renewing mains; (4) the small increase in the price of gas charged to consumers since June last year. As regarded the actual carrying on of the gas-works, this has been as satisfactory as in previous years.

GAS AND ELECTRIC LIGHTING IN BRUSSELS.

Reports of the Gas and Electric Light Committee.

We learn from the reports of the Gas and Electric Light Committee of the Brussels Municipality for the past year, which have lately been issued, that the total quantity of gas sold was 33,230,010 cubic metres, or about 1,173,020,000 cubic feet, compared with 31,474,415 cubic meters, or about 1,111,047,000 cubic feet, in 1899. The total production of gas in the past twelve months reached 40,768,250 cubic metres (1,439,119,225 cubic feet); being 2,044,090 cubic metres (72,156,377

cubic feet) more than in 1899. The entire bulk of gas was disposed of as follows :—

	Cubic Metres.
Ordinary consumers	25,773,443
Municipal establishments, at 10 c.	901,963
Gas-engines, at 10 c.	2,240,879
Industrial purposes, at 10 c.	1,380,964
Heating purposes, at 10 c.	1,502,310
Illuminating devices, balloons, &c.	97,802
Artizans' dwellings and miscellaneous	1,332,649
Total sold	33,230,010
Public lighting and illuminations	5,198,855
Used on the works, &c.	1,334,840
Unaccounted for	1,004,545
Total production	40,768,250

The total receipts amounted to 7,310,400 frs. (£292,416), and the expenses to 5,996,538 frs. (£239,862)—leaving a balance of 1,313,862 frs. (£52,554), compared with 2,108,150 frs. (£84,326) in 1899. Allowing 503,468 frs. for the increased value of the stores, the profit from the working of the undertaking is brought up to 1,817,330 frs. (£72,693).

The portion of the report dealing with the manufacturing operations shows that 128,669 tons of coal were carbonized and 1841 tons of oil employed for enrichment last year, compared with 122,273 tons and 1344 tons respectively in 1899. The quantity of coke sold at the works was 862,704 hectolitres (about 2,372,436 bushels)—the greater part of the production. All the tar products were disposed of regularly, at fairly remunerative figures. Sulphate fetched a higher price than in 1899; and at the close of the year there was but little in stock. The breeze was utilized as usual in the manufacture of compressed fuel, which is employed in heating the retorts and in raising steam. The new works referred to in the previous report on the gas supply, were completed last year, and were brought into use at the beginning of the winter. The total amount of capital employed in the undertaking at the close of the year 1900 was 26,689,291 frs. (£1,067,572), compared with 24,989,291 frs. (£999,572) at the corresponding period of 1899.

With regard to distribution, mains to the extent of 184,752 metres (203,227 yards) occupied the subsoil of the city on Dec. 31 last, compared with 187,425 metres (206,167 yards) at the end of 1899. The reduction was caused by the temporary lifting of the mains in one quarter of the city. The leakage amounted to 2·46 per cent. of the gas sent out, against 2·75 and 3·24 per cent. in the two preceding years. The number of meters in use was 29,566, or 2757 more than in 1899. There were 561 prepayment meters fixed; making a total of 2707 meters of this kind in the city. Of interior installations there were 2323 fitted up—bringing the total to 10,029; and 549 rising mains were laid on, increasing the number to 4083. The gas-stoves on hire numbered 21,328, against 14,729 and 13,038 in the two preceding years; and 341 gas-engines, representing 3561-horse power, were at work—the larger number in printing and bookbinding establishments, but some were employed in the production of electric current. Outside lanterns are let to private consumers; the annual charge being 50 frs. for a single-jet, and 100 frs. for a five-jet lamp, including gas, lighting, extinguishing, and maintenance, but not fixing. There had been placed 16 of the former and 131 of the latter lamps on the 31st of December. For the public lighting there were employed 6367 lamps, of which 754 were fitted with high-power burners. The total number of lighting hours was 3839.

The workpeople and their families are well cared for by the Gas Department. The men receiving 3·66 frs. per day in 1896, last year had 3·91 frs.; and those who were formerly paid 3·72 frs. and 4·29 frs., now get 4·26 frs. and 4·43 frs. The dwellings erected for the men contain 59 families; the school in connection therewith being attended by 58 children. Baths are provided for the women and children, as well as at the works for the men; and they are much in request. The provident fund consists chiefly of deductions from wages and salaries, which amounted last year to 15,501 frs. (£620); and a like sum was given by the Municipality. The total revenue was 37,018 frs. (£1481); and the expenditure, 32,227 frs. (£1289)—23,291 frs. (£932) being sick-pay. The reserve at the close of the year stood at 5877 frs. (£235).

According to the report dealing with the electricity supply undertaking, the Municipality possess three stations, situated in the Rue Melsens, the Rue de Louvain, and the Rue de la Vanne. The first is equipped with five 500-horse power steam-engines, working ten dynamos of 1100 amperes at 130 volts; two engines, of 1000 and 1300 effective horse power respectively, working two dynamos of 2600 amperes at 260 volts; and accumulators equal to supplying 700 amperes of current for eight hours. In the second station there are eight gas-engines of 120-horse power; four dynamos of 310 amperes at 125 volts and six of 310 amperes at 250 volts; and accumulators equal to supplying 250 amperes of current for eight hours. This station receives 1000 amperes of current at 220 volts by direct cable from the station in the Rue Melsens. In the third station there are four gas-engines of 60-horse power, actuating four dynamos of 130 amperes at 130 volts and two of 130 amperes at 260 volts, together with accumulators equal to supplying 125 amperes of current for eight hours. The productive capacity of two of the stations is to be increased during the current year. The length of streets cabled at the close of last year was 61,782 yards, compared with 55,567 yards a year previously; the entire length of cable being 190 miles, supplying 1808 services. The capital invested in the undertaking on Dec. 31 was 7,863,903 frs. (£314,556). The expenses in the past year amounted to 482,808 frs. (£19,312); the receipts, to 1,330,598 frs. (£53,224)—showing a balance of 847,790 frs. (£33,912) in favour of the Municipality. The number of consumers on Dec. 31 last was 1861, against 1457 on the corresponding day in 1899. The number of lamps installed (reduced to the unit of 16 candles) was 107,390, against 84,954; being an average of 190 lamps per 100 metres of street cabled. The maximum output was on the 20th of December—18,115 amperes, corresponding to about 36,230 lamps of 16-candle power in use simultaneously, or 34 per cent. of the total number of lamps installed. The average price charged is 6 c. per hectowatt-hour. The public lighting by electricity is confined to the Grand' Place, in which two lamps of 20 amperes have been put up; the Parliament Gallery, where there are three lamps of 10 amperes; and the Parc, which is lighted (in summer only) by 34 lamps of 12 amperes.

ELECTRIC LIGHTING NOTES.

The loss on the Bury Corporation electricity works during the past year was about £600, "due to dear coal, greater interest on borrowed capital, a larger sinking fund, and further repairs."

Replying to a request by the Winsford District Council for an extension of the time allowed by their Electric Lighting Order, the Board of Trade have informed them that they have no power to grant it. The Council have instructed their Clerk to write to the Board to the effect that it would not be well to revoke the Order. The Board may think otherwise.

The maximum demand system of charging for electricity has proved a failure in Salford, and is to be abolished in favour of a uniform price. Alderman Shaw states that the former has occasioned a loss to the Corporation of £1900 in the last three months; and the loss will go on as long as the system is continued. The charge is now to be 2d. per unit for power purposes and 4½d. for lighting, with a discount of 2½ per cent. for payment within a month of demand.

The Hoylake and West Kirby District Council have applied to the Local Government Board for permission to borrow £13,500 for electric light works extensions. Mr. H. P. Boulnois inquired into the application last Wednesday. The statements which he heard showed that the Council have already received sanction to borrow £27,000; but they have exceeded this expenditure by £3000. The works (which were opened on Saturday) are capable of producing current for the supply of 7000 8-candle power lamps; and applications have been received for 6000. Believing that the demand will still greatly increase, the Council are desirous of extending the capacity of the plant so as to be equal to 14,000 lamps.

The first report of the Borough Electrical Engineer of Bootle (Mr. W. R. Wright) has just been issued. Though it shows an estimated deficit of £1800, the Engineer considers the figures are "full of encouragement." The plant put down was capable of dealing with a large tramway load; but it only had a small one up to October last. Liverpool expected to take some 700,000 units per annum. So far this year they had taken 395,000 units, or about half; so that the plant had been practically idle for the half year. The following is the number of units generated during the year, allocated to their different headings: Public lighting, 130,913; tramways, 337,061; meters, 159,495; works, 21,900; lost feeders and batteries, 81,035—total, 730,404.

It is not an uncommon thing to find miscalculations and omissions in estimates for electric lighting works. Owing to shortcomings in the estimates at Crewe, the Electric Lighting Committee last Wednesday had to appeal to the Council to allow an application to be made to the Local Government Board for sanction to borrow a further £5000 for electric lighting purposes. It was explained that down to the end of March of this year, the sum of £27,056 had been expended, and that, after adding other liabilities that had been incurred, there was £4364 to be provided above the £35,970 already sanctioned. The buildings, which were estimated to cost £4000, had actually cost £7000; and the cables, which had been estimated to cost £5900, had actually cost £6900. The accounts of the department show that a profit of £25 5s. 11d. has been made!

A report and statement of accounts in connection with the electricity supply works of the Sheffield Corporation has lately been issued. The particulars contained therein apply to the fifteen months ending March 25 last; this period having been selected so as to bring the department into line with the others. The total capital outlay to the above-named date was £433,015. The income was £41,939; the expenditure, £15,986—leaving a gross profit of £25,953. From this must be deducted the interest on mortgages and stock and bank charges, £15,875, and the second instalment set aside out of revenue for the extinction of loan indebtedness, £6029; leaving a financial result, after covering all charges, of £4049. Adding the balances from 1898 and 1899, there is a present available surplus of £6294. The number of consumers on the 25th of March was 1434; and the number of units generated in the period covered by the report was 3,108,927.

At the last monthly meeting of the County Borough Council of Belfast, the Gas and Electric Light Committee's minutes contained statistics as to the electric light rental for the year ending the 31st of March last. Mr. Wellington Young, in moving the adoption of the minutes, said the receipts for current supplied during the year showed an increase of £2457, or 20·8 per cent., over the previous year; in meter or motor rents there was an increase of £277, or 75·5 per cent.; in the hire of fittings, an advance of £48; and in units sold, a rise of 226,607, or 33·2 per cent. The units sold for lighting showed an increase of 167,072, or 28 per cent.; and those for motor purposes an augmentation to the extent of 59,535, or 69·2 per cent. The charges per unit for current during the year were: Lighting, 6d. for the first hour, and 2d. after; churches, 5d. per unit; motors, 3d. for the first hour, and 1½d. after. This was a very considerable reduction from the charges for the previous year, and he thought everyone ought to be satisfied. The minutes were adopted.

Paignton seems likely to be disappointed of the electric lighting scheme which it was promised by Mr. Paris Singer, a local resident. Mr. Singer, who is at once wealthy and an amateur electrician, laid before the District Council a scheme for the provision of electric lighting works, of which he was to bear the whole cost of construction. He proposed to carry it on as a business undertaking for ten years, and then turn it over to the Council at a price not exceeding the outlay. The Council were very pleased with the proposal, which offered a good deal of advantage at very little risk. Difficulty has, however, arisen because of the impossibility of the Council pledging their successors to purchase the undertaking in ten or any other number of years. The Solicitor to the Local Government Board has been consulted, and has advised that powers cannot be granted now for the completion of the purchase some time in the future. The Lighting Committee have accordingly come to the conclusion that it is impossible to make further progress; and the Council have decided to inform Mr. Singer that they cannot accept his offer.

The Newport (Mon.) Corporation have an electric installation which has cost £100,000, and has not paid its way for the seven years of its existence, because the plant cannot be profitably employed during the

whole of the day, being needed only for lighting purposes. The Corporation now seek to put up another generating station for traction purposes, and to spend a sum which has been reduced from about £180,000 to £120,000. The promoters of a public meeting recently held ask that the present station shall be adapted to the purposes of both light and traction. The Council, at their last meeting, adopted a modified scheme for the new traction station. Thus, they would be compelled to keep both stations going, which would entail much additional expenditure in the matter of staff and superintendence. There seems to be room for a reconsideration of the position. It is the opinion of people who are well able to judge that for an outlay of £25,000 the present station can be equipped so as to provide light and power for all up-to-date requirements for many years to come. It is suggested that a poll should be taken on the question.

The electric lighting and dust destructor scheme for Walker is meeting with renewed opposition. At the last meeting of the District Council, the Electric Lighting Committee reported that a letter had been sent to the Local Government Board on behalf of the Walker shipbuilders, asking that the progress of the scheme should be stopped pending a further inquiry. It placed in detail a whole set of what are held to be facts relating to the present position of the scheme, and pointed out that the signatories, representing 58 per cent. of the total rateable value of Walker, were convinced that the outcome of the scheme could only be a considerable burden to the rates of the district. Its net result, according to the letter, appeared to be that the district was saddled with an annual payment of about £2100 for the 15 years after the completion of the present agreement with the Newcastle Supply Company, and further that it would possess a destructor which would increase the cost of disposing of the refuse by about £2400 per annum in perpetuity, while there was no possibility of any revenue to set against this. The Chairman (Rev. Father Berry) dealt in an explanatory way only with the letter; pointing out that the Local Government Board had sanctioned the scheme.

Mr. W. H. Trentham, the expert called in by the Barnstaple Town Council, has presented an elaborate report on the lighting of the town by electricity. It had been thought by some that water power at Raleigh could be utilized; but Mr. Trentham found that the flow of water was so small that it was unnecessary to make any detailed calculations upon it. He recommends steam as the motive power. Public lighting is to be confined to streets where mains are laid for private consumers. For public lighting, he says arc lamps are best; but in view of the narrowness of the streets, incandescent lighting could with advantage be adopted. He considers that 2660 lamps of 16-candle power would soon be taken up in the compulsory area; and the capital expenditure for this would be £16,225. But Mr. Trentham thinks development should be arranged for, and he recommends that 5400 lamps should be provided for. This would mean a total expenditure of £21,450. A profit and loss account showed an estimated balance of £727, the charge to private consumers being put at 6d. per unit. The Electric Lighting Committee decided to recommend the Council to adopt Mr. Trentham's scheme; and at the meeting of that body on Monday last week this was done, and it was decided to apply to the Local Government Board for powers to borrow the money required.

According to the abstract of the accounts of the Lancaster Corporation for the past financial year which has been prepared by the Borough Accountant (Mr. W. Clough), the Electricity Department was not quite so successful as was expected. It was estimated that the net surplus available for the district fund would amount to £500, whereas only £427 has been handed over. Taking the last six years, there was a loss on each of the first two; but a profit has since been made, though it dropped from £1191 in 1898-9 to £420 in the following year. The income has increased, but so has the expenditure—manufacturing charges going up from £1202 two years ago to £2069 in the year lately closed. The increase is due partly to the rise in the price of coals. For the year ending March, 1900, coal cost £853; whereas last year it rose to £1248. There was also a small increase in the sum set aside for redemption of debt, and £750 was placed to the reserve fund; being £500 more than in the previous year. The capital expenditure upon the electricity works amounts to £35,380—an advance in the year of £2585. The premiums obtained on the Corporation's 3 per cent. redeemable stock, less compensation paid to mortgagees, again brought forward, reduces this amount to £35,060; but the sum set aside for the redemption of stock, with interest accrued on investment, &c., is £1792. This leaves the total liability of the borough on the works at £36,749—an increase over last year of £2564.

Mr. H. Percy Boulnois, of the Local Government Board, held an inquiry last Wednesday at Liverpool, touching an application by the Corporation for sanction to borrow £300,000 for purposes of electric lighting. The Town Clerk (Mr. E. R. Pickmere) stated that the Corporation purchased the undertaking of the Liverpool Electric Power Company in 1896, and they had power to borrow £500,000, of which £400,000 had been spent in buying out the shareholders. In 1897 the Corporation asked for borrowing powers for £100,000; and this was sanctioned in two sums, £56,000 in September of that year, and £44,000 in January, 1899. The Corporation again applied for £388,700; and sanction was given in January, 1900, for £300,000, and the balance, which was for pumping-engines, dynamos, and plant at Cobb's Quarry and Lister Drive stations, was included in the amount now applied for. The output of electrical energy by the Company in 1896 was 1,352,511 units; in 1900, under the Corporation, it was 11,500,000 units, while the estimate for 1901 was 20,000,000 units. In 1897 the Corporation purchased the tramways, and had now nearly 100 miles of tramways worked by electrical energy. The number of consumers at the time of the purchase was 1300, last year 3450; the number of lamps 52,490, last year 158,000; horse power 6240, last year 22,000; price charged for lighting 7½d. per unit, last year 4d.; for power 5d., last year 2d. up to 3000 units per quarter, and 1½d. per unit above. The present application for £300,000 was to enable the Corporation to continue the work. The demand was very largely increasing; and the amount now proposed to be borrowed would serve for only about twelve months. The city of Liverpool was their area of supply; but if Garston were incorporated, their district would be extended. Mr. A. B. Holmes, the Electrical Engineer, explained the plans at some length.

SHEFFIELD CORPORATION WATER SUPPLY.

A Prosperous Undertaking.

A Meeting of the Water Committee of the Sheffield Corporation was held last Wednesday, to receive and adopt for presentation to the Council the report and accounts for the year ending the 25th of March last. The accounts show a surplus of £25,483, which is the largest earned by the water undertaking since it was acquired by the Corporation at the beginning of 1888. For the year ended March 25, 1900, the surplus was £17,037; so that on a capital expenditure which, so far as regards the existing water-works, has not materially increased, there has been a growth of £8445, or practically 50 per cent., in the profits earned. This remarkable result has been achieved in spite of the continued surrender of half the amount of the 25 per cent. extra charges added to the Sheffield water-rates by the Act of 1864. At Christmas, 1897, 12½ per cent. was struck off the water-rates, and the effect of this reduction in the year just closed is that the Committee have foregone £12,160 of revenue which would otherwise have accrued to them. But for this, the year's surplus would have been more than £37,000, instead of the sum mentioned above. A further remission is promised after the 29th of September next, when the remaining 12½ per cent. will be taken off; and from that date the Committee will relinquish revenue to the amount of £25,000 a year. By so doing, they will redeem the promise made when the undertaking was acquired from the Water Company, who had obtained parliamentary power to impose in perpetuity the extra charges due to the Dale Dyke disaster. In the thirteen years which have elapsed since the transfer, there have been deficiencies, according to some particulars contained in the "Sheffield Independent," in four years—one of which included the very frosty winter of 1895-6, with its heavy expenditure on renewals of mains—and surpluses in nine years. Since 1897 the latter have shown continuous and rapid growth—£9557, £13,843, £14,005, £17,037, and now £25,483. The total accumulated surplus up to date is £76,179. Out of this sum, and future surpluses the Committee have to provide for the promised reduction of 12½ per cent. in water charges after the 29th of September next, and they have also to meet the heavy interest and sinking-fund charges which will have to be borne out of the water revenue in respect of the new works in the Little Don Valley from March next. The Water Act of 1896 provided for a suspension of the above-named charges for five years, but as this period is about to expire, the Committee have now to prepare to meet them. They will amount to upwards of £23,000 a year, and will be a heavy burden for some years, as there will be no immediate corresponding expansion of revenue.

From the report of the General Manager (Mr. W. Terrey) we find that a sum of £29,405 was spent on capital account last year, bringing up the expenditure to £2,316,692, exclusive of £402,100 spent on the Little Don works; making altogether £2,718,792. The income from water-rates was £136,220, against £125,106; showing an increase of £11,114, or 8·88 per cent., against 5·93 per cent. in 1899-1900. The miscellaneous receipts were £6217; and they brought up the income to £142,437, which was £11,222 more than before. Deducting the maintenance and management expenses (£28,926), annuities, &c. (£81,178), and the instalment of the sinking fund (£6850), there remains the surplus of £25,483, as stated above, which is an increase of £8445 on that of last year. Mr. Terrey says, in reference to the past year's working: "It should be borne in mind that the above result is attained notwithstanding the reduction, from Dec. 25, 1897, of one-half the amount of the 25 per cent. added to the water-rates by the Sheffield Water-Works Act, 1864. This obligation has involved a reduction in the water revenue as follows: Three months to March 25, 1898, £2755 10s. 9d.; for the year to March 25, 1899, £11,109 0s. 2d.; for the year to March 25, 1900, £11,414 12s. 8d.; for the year to March 25, 1901, £12,160 11s. 6d. The remaining half of the 25 per cent. will be remitted, in accordance with the instructions of the Water Committee, from and after the 29th of September next." The additional number of houses put on during the year was 3499; making a total of 89,795. The number of water-closets now supplied is 18,915—an increase of 3852. The extra number of baths was 829; making a total of 7231. There are 3551 water-meters in use, against 3485 at the close of the past financial year. The total domestic and trade supplies on the 25th of March last was 132,802; being an increase of 9980 "new supplies" during the year. Mr. Terrey closes his report with some particulars showing the progress of the Little Don Valley works since their commencement four years ago.

Incandescent Gas Lighting in Berlin.—The last report relating to the municipal gas-works of Berlin sets forth that on the 31st of March, 1900, there were 27,900 incandescent gas-burners employed for street lighting. Of this number, 15,673 were in single-burner lanterns, 11,332 in lanterns with two burners, 855 in those having three burners, and 40 in those having five burners. In burners in use for 3675 hours, 5·9 mantles and 1·8 glass chimneys were employed; and in those alight for 1900 hours, 5·5 mantles and 1·5 chimneys.

Members' Dealings with Corporations.—Without comment, the Nelson Corporation last Wednesday adopted the following report by a Committee who were appointed to look into the position of members having interests in contracts or other dealings with the Corporation: "That, having considered the case of Councillor Haighton, we find that Messrs. Haighton, Limited, have traded with the Nelson Corporation during the past financial year to the extent of £798—an amount incurred principally on account of the sale and purchase of gas-stoves selected by gas consumers. We have carefully investigated the subject-matter of such sale and purchase, and examined the accounts and the method of ordering and supplying the goods in question; and we are agreed in finding that Councillor Haighton, as a shareholder in a limited joint-stock company, is not occupying any illegal position or trading illegally with the Corporation, nor do we consider this to be a case of municipal trading within the meaning of the statute. This Committee have considered their statements, and are agreed in finding and reporting that there is no case of municipal trading with the Corporation or its Committees or officers by any other member of the Council."

NOTES FROM SCOTLAND.

From Our Own Correspondent.

Saturday.

According to custom, the Dundee Corporation are the first of the large gas-works owners in Scotland to issue their annual accounts. These appeared on Monday, on which day they were laid before the Gas Committee. They have not been fully published; but I imagine that what has been given is correct. It is stated that the total quantity of gas delivered amounted to 611,452,200 cubic feet, realizing £107,664, or, allowing for debts and discount, £103,081. Last year the quantity delivered was 622,304,000 cubic feet, and the revenue £106,119, showing a decrease this year of £3038—and that, too, despite the fact that the price was 6d. per 1000 cubic feet higher than in 1900. The expenditure was £123,639, or £3084 in excess of the sum estimated. From the revenue there falls to be deducted £4366 discount, and £217 bad debts—£4583 in all. At the works there was consumed 7,018,000 cubic feet; and there was 42,236,700 cubic feet unaccounted for, being equal to 6·907 per cent. The principal feature of the estimates for the current year is the proposed reduction in the price of gas by 4d. per 1000 cubic feet—to 3s. 6d., from 3s. 10d. The consumption is put at 612 million cubic feet; while the revenue from it is estimated at £94,688, which, together with £8000 from chemical products, £6000 from coke, and other items, brings out a total revenue of £108,839. The expenditure, which includes £8653 from the year just closed, is put down at £108,528, leaving an estimated surplus of £310. To produce the necessary gas would require 61,200 tons of coal, at a production of 10,000 cubic feet per ton, the total cost of which, at 14s. 2d. per ton and 2s. 6d. for carbonizing, will be £51,000. It is anticipated that a considerably larger amount will be received from coke; the estimate being placed at £6000, as against an actual revenue of £3592 last year. The reduction in the price of gas, it is said, has been found possible owing to the heavy fall in coal.

The Gas Committee had before them, it is said, explanations by the Manager (Mr. W. M'Crae), which were chiefly to the effect that the coal sent in was of inferior quality, and did not yield the return which was expected; and an understanding was come to, amounting practically to an instruction, that in future there are to be three tests a day of the quality of the coal supplied. The contractors are to be made aware of the results, in order to safeguard the interests of the Corporation in any proceedings for rebate in respect of inferior quality. The Committee agreed to the proposal to reduce the price of gas; but in view of the estimated surplus being so small, they decided to recommend that £500 less should be added to the contingent fund, which would raise the estimated surplus to over £800. The accounts will be more fully described when they are laid before the Council—probably next week.

A subject of more than usual delicacy comes to my hand, in the matter of the working results of the Hamilton Corporation Gas Department for the past year. A year ago Mr. William Ewing, who was then Manager at Hamilton, recommended a reduction in the price of gas of 1½d. per 1000 cubic feet—from 2s. 1d., at which it had stood for seven years. The Corporation, however, declined to make the reduction, and retained the 2s. 1d. rate. It turns out that, even with the retention of the price, there was a deficit on the working of £1344, or, if £1200 be allowed for depreciation, of £2544. Speaking at a meeting of the Corporation on Thursday, Bailie M'Hale, the Convener of the Gas Committee, said that in almost every item there was a deficit. Coal had cost £11,025, or £611 over the estimate; and wages were £3399, or £549 over the estimate. The estimated consumption of gas was 134 million cubic feet, and the revenue from it £13,958; whereas the consumption had been 121 million cubic feet, and the revenue £12,512—a decrease of £1446. Gas-stoves were estimated to yield £350, whereas they had returned only £202, a difference of £148. The make of gas was 143 million cubic feet; and there was thus 22 million cubic feet unaccounted for. The proposed increase in the price of gas would, it was estimated, produce a surplus of £2400. Bailie M'Hale repudiated the idea that the adverse state of matters had arisen on account of any carelessness on the part of the Committee, or from the change of Managers in the course of the year, because they were perfectly satisfied with Mr. Ballantyne. The proposals of the Committee were agreed to; and the price of gas was raised by 5d. per 1000 cubic feet as from March 14 last. The delicacy of the situation arises from the fact that a change was made in the managership in November last, when half of the year had expired. At that time there were no indications that the working results were not up to expectation. Now we are assured that Mr. Ballantyne is not to blame. It is difficult to discover a neutral line between the two positions; but probably fuller knowledge of the circumstances would enable such to be found. It must be a vexation to Mr. Ballantyne to see his first balance at Hamilton come out wrong. But he has the satisfaction of knowing that he has the Committee with him; and I think they cannot get too much credit for standing by him. It may be that Mr. Ewing had schemes which he did not quite enter into the spirit of; and that when he is the conceiver as well as the executant of the policy of the department, he will be able to show a different result. There were quite a number of changes in the ranks of gas managers last year; and it will be interesting to see how matters have gone in such cases.

In the course of their consideration of the question of how to most economically introduce an electric lighting installation, the Town Council of Dumfries consulted an engineer upon the available water power. The report was adverse to the proposal to employ water power; and they are now considering a communication which offers to fit up plant to drive engines of 500-horse power by Mond gas at a cost of £1500, or of 750-horse power at a cost of £2000.

Several months ago the Corporation of Perth received a report from Mr. W. B. M'Lusky, their Engineer and Manager, in which he recommended a change in the method of hiring out gas stoves and cookers. The scheme is a financial one; but it involves the dispensing with the employment of an agent, who has been the means of building up the business in gas-stoves. On account of this circumstance, the scheme was not universally favoured; there being a feeling that the agent was

GAS AND WATER COMPANIES' STOCK AND SHARE LIST.

Referred to on p. 1567.

Issue.	Share.	When ex. Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p.c.	GAS COMPANIES.			£ s. d.
590,000	10	Apl. 12	10½	Alliance & Dublin 10 p.c.	19—20	..	5 5 0
100,000	10	,,	7½	Do. 7 p.c.	13—14	..	5 7 2
300,000	100	Jan. 2	5	Australian 5 p.c. Deb.	102—104	..	4 16 2
200,000	5	May 15	6½	Bombay, Ltd.	6—6⅜	..	5 0 0
40,000	5	,,	6½	Do. New, £4 paid	4¼—4⅜	..	5 9 5
380,000	Stk.	Feb. 14	12	Brentford Consolidated	260—265	..	4 10 7
270,000	,,	,,	9	Do. New	190—195	+3	4 12 4
50,000	,,	,,	5	Do. 5 p.c. Pref.	128—132	..	3 15 9
159,375	,,	Dec. 13	4	Do. 4 p.c. Deb.	113—116	..	3 9 0
220,000	Stk.	Mar. 14	10	Brighton & Hove Orig.	222—227	..	4 8 1
226,320	,,	,,	7	Do. A. Ord. Stk.	158—163	−2	4 5 11
1,022,500	Stk.	Feb. 27	5	Bristol, 5 p.c. max.	121—123	+2	4 1 4
420,000	20	Mar. 28	10	British	41—42	..	4 15 3
50,000	10	Feb. 28	12	Bromley, Ord. 10 p.c.	24—26	..	4 12 4
79,000	10	,,	9	Do. 7 p.c.	19—21	..	4 5 8
500,000	10	May 31	6	Buenos Ayres (New) Ltd.	8½—9⅝*	..	6 6 4
220,000	Stk.	Dec. 28	4	Do. 4 p.c. Deb.	95—98	−2	4 1 8
150,000	20	Mar. 14	8½	Cagliari, Ltd.	22—24	..	6 17 6
100,000	10	May 31	10	Cape Town & Dis., Ltd.	14½—15⅛*	..	6 9 0
50,000	50	May 2	6	Do. 6 p.c. 1st Mort.	51—53	..	5 18 2
550,000	Stk.	Apl. 12	12	Commercial Old Stock	275—280	..	4 5 9
236,425	,,	,,	9	Do. New do.	205—210	..	4 5 9
238,237	,,	Dec. 13	4½	Do. 4½ p.c. Deb.	130—135	..	3 6 8
800,000	Stk.	May 31	9	Continental Union, Ltd.	160—165*	..	5 9 1
200,000	,,	,,	7	Do. 7 p.c. Pref.	160—165*	..	4 4 10
575,000	Stk.	Feb. 28	5	Crystal Palace Ord. 5 p.c.	120—125	..	4 0 0
60,000	,,	,,	5	Do. 5 p.c. Pref.	125—130	..	3 16 11
486,090	10	Jan. 31	11	European, Ltd.	20—21	..	5 4 9
354,060	10	,,	11	Do. £7 10s. paid	14½—15½	..	5 6 5
15,079,885	Stk.	Feb. 14	4⅛	Gas- 4 p.c. Ord.	95—97	+1	4 10 9
2,600,000	,,	,,	3⅛	light 3½ p.c. max.	90—92	..	3 16 1
3,799,735	,,	,,	4	and 4 p.c. Con. Pref.	108—111	..	3 12 1
4,063,425	,,	Dec. 13	3	Coke 3 p.c. Con. Deb.	93—95	..	3 3 2
70,000	10	May 31	8	Hongkong & China, Ltd.	13—14*	..	5 14 4
3,800,000	Stk.	May 15	10	Imperial Continental	207—212	−3	4 14 4
473,600	Stk.	Feb. 14	3½	Do. 3½ p.c. Deb. Red.	100—102	..	3 8 8
561,000	Stk.	Feb. 28	10	Liverpool United A	234—236	..	4 4 9
678,100	,,	,,	7	Do. do. B	172—176	..	3 19 7
306,083	,,	Dec. 28	4	Do. do. Deb. Stk.	120—122	..	3 5 7
75,000	5	Dec. 13	4†	Malta & Medn., Ltd.	4⅜—5⅛	..	5 14 3
560,000	100	Apl. 1	5	Met. of 5 p.c. Deb.	104—107	..	4 13 5
250,000	100	,,	4½	Melbourne 4½ p.c. Deb.	102—104	..	4 6 6
541,920	20	May 31	3½	Monte Video, Ltd.	9—10*	..	7 0 0
717,946	Stk.	Feb. 22	8½	Newc'tle & G'tesh'd Con.	230—231	..	3 13 7
312,855	Stk.	Dec. 28	3½	Do. 3½ p.c. Deb.	99—101	..	3 9 4
150,000	5	May 15	8	Oriental, Ltd.	6⅞—7⅛	..	5 10 4
135,000	5	,,	8	Do. New, £4 10s. pd.	5⅜—6⅛	+⅛	5 15 3
15,000	5	,,	8	Do. do. 1879, £1 pd.	1⅛—1⅜	..	4 11 5
				*Ex. div.			

Issue.	Share.	When ex. Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p.c.	GAS COMPANIES.			£ s. d.
60,000	5	Feb. 28	7	Ottoman, Ltd.	5⅜—6⅛	..	5 12 0
851,070	10	Apl. 26	7	River Plate Ord.	10⅜—11⅛	..	6 4 5
250,000	Stk.	Dec. 28	4	Do. 4 p.c. Deb.	98—100	..	4 0 0
250,000	10	Mar. 28	8	San Paulo, Ltd.	11—12	..	6 13 4
135,000	Stk.	Mar. 14	10	Sheffield A	235—240	..	4 3 4
209,984	,,	,,	10	Do. B	234—236	..	4 4 9
523,498	,,	,,	10	Do. C	232—234	..	4 5 6
5,767,885	Stk.	Feb. 14	5	South Met., 4 p.c. Ord.	125—128	−1	3 18 2
1,547,965	,,	Jan. 16	3	Do. 3 p.c. Deb.	93—96	..	3 2 6
380,940	Stk.	May 15	5	Southampton Ord.	106—111	..	4 10 1
70,825	,,	Jan. 16	4	Do. 4 p.c. Deb.	105—110	..	3 12 9
120,000	Stk.	Feb. 28	6	Tottenham A. 5 p.c.	115—120	..	5 0 0
250,520	,,	,,	4½	and B. 3½ p.c.	85—90	..	5 0 0
80,100	,,	Dec. 13	4	Edmonton 4 p.c. Deb.	109—114	..	3 10 2
182,380	10	Jan. 16	5	Tuscan, Ltd.	8—9	..	5 11 1
149,900	10	Jan. 2	5	Do. 5 p.c. Deb. Red.	97—102	..	4 18 0
230,000	5	Feb. 28	9	West Ham, 10 p.c.	9—10	..	4 10 0
147,000	10	,,	6	Do. 7 p.c.	11½—12⅜	..	4 16 0
128,984	Stk.	Dec. 28	4	Do. 4 p.c. Deb.	105—110	..	3 12 9
				WATER COMPANIES.			
780,499	Stk.	Dec. 28	11	Chelsea, Ord.	292—297	..	3 14 1
150,000	,,	,,	5†	Do. 5 p.c. Pref.	155—160	..	3 2 6
160,000	,,	,,	4⅛†	Do. 4½ p.c. Pref. '75	138—143	..	3 2 11
175,785	,,	Mar. 28	4½	Do. 4½ p.c. Deb.	140—145	..	3 2 1
1,720,560	Stk.	Apl. 12	7	East London, Ord.	188—193	..	3 12 6
654,740	,,	Dec. 13	4½	Do. 4½ p.c. Deb.	145—150	..	3 0 0
980,169	,,	,,	3	Do. 3 p.c. Deb.	95—97	..	3 2 6
700,000	50	Dec. 13	8	Grand 10 p.c. max.	105—108	..	3 14 1
310,000	Stk.	Mar. 28	4	Junction 4 p.c. Deb.	123—127	..	3 3 0
708,000	Stk.	Feb. 14	14	Kent	296—301	−2	4 13 0
160,000	,,	,,	7	Do. New, 7 p.c. max.	200—205	..	3 8 4
1,043,800	100	Dec. 28	10½	Lambeth, 10 p.c. max.	270—280	..	3 15 0
406,200	100	,,	8	Do. 7½ p.c. max.	207—212	..	3 15 5
350,000	Stk.	Mar. 28	4	Do. 4 p.c. Deb.	123—126	..	3 3 0
500,000	100	Feb. 14	13⅜	New River, New Shares	405—410	..	3 7 1
1,000,000	Stk.	Jan. 31	4	Do. 4 p.c. Deb.	125—130	..	3 1 7
902,360	Stk.	Dec. 13	7	South- Ord.	180—185	−8	3 15 8
126,500	100	,,	7	wark 7½ p.c. max.	170—175	−7	4 0 0
489,200	Stk.	,,	5	and 5 p.c. Pref.	153—158	..	3 3 3
1,019,585	,,	Apl. 12	4	Vauxhall 4 p.c. A Deb.	125—130	..	3 1 7
1,155,066	Stk.	Dec. 13	10	West Middlesex.	265—270	..	3 14 1
200,000	,,	,,	4½	Do. 4½ p.c. Deb.	140—145	..	3 2 1
200,000	,,	Mar. 14	5	Do. 3 p.c. Deb.	95—98	−½	3 3 1
				*Ex. div.			

† Next dividend will be at this rate.

being hardly dealt with. Further consideration has been given to Mr. M'Lusky's prposals. The Town Council met in Committee this week; and after a long discussion, they agreed to recommend to themselves in open Council to adopt the new arrangement. The open meeting is to be held next week.

Only a few weeks ago the Corporation of Perth formally inaugurated new gas-works, which had been erected at a cost of about £45,000. Last Saturday they opened electric light works, which have been erected at a cost of about £30,000. This is an interesting situation, the two works starting so near each other.

The gas transfer at Helensburgh has resulted in a benefit to the community. At a meeting of the Town Council last Saturday, Bailie Bryden, the Burgh Treasurer, submitted a statement of the gas finances for the past year. The capital expenditure in the purchase and improvement of the works now amounted to £38,509, and the contracts in progress would bring up the indebtedness to £44,000. The revenue receipts were £11,245, and the expenditure £8321, leaving a balance of £2924 at credit. The gas sold amounted to 37,371,000 cubic feet. The cost of production had been 4s. 0¾d. per 1000 cubic feet, and the profit on the sale 6¼d. The surplus profits amounted in all to £1914; and in the two years the community had benefited by the purchase to the extent of £4000. The estimates for the current year showed a probable income of £9891, and an expenditure of £9012, leaving an estimated surplus of £897. It had been arranged that the gas for public purposes should be charged at the same rate as to private lighting consumers. The estimates which had been accepted showed a decrease in the price of coal of 3s. 2½d. per ton, which represented a saving of £800. In view, however, of the improvements in progress at the works, which they desired to meet out of revenue, Bailie Bryden proposed that the old rates be continued—viz., to general consumers, including public lamps, 4s. 7d. per 1000 cubic feet; consumers by stoves, fires, and engines, 3s. 9d.. The report and recommendations were seconded by Mr. Mackay (Convener), and adopted.

Not very long ago a crack in the concrete tank of a new gasholder at the Troon Gas-Works led to a good deal of trouble. The question of the responsibility for the crack was submitted to Mr. W. R. Copland, of Glasgow, as Arbitrator; and he has this week decided that the contractor is not liable. The Corporation are to pay the expenses of the reference.

In the course of a few months, the Lesmahagow Gas Company will have completed 57 years of existence. Soon after the value of Lesmahagow coal as a gas-making material was established, a meeting of the inhabitants of Abbeygreen, which is the central portion of the parish of Lesmahagow, was held on Sept. 2, 1844, to consider the propriety of erecting gas-works. The object was warmly approved of, and a Company was speedily organized. On the 24th of that month, arrangements were entered into to have the works forwarded with all expedition. After considerable difficulty and delay in securing a site, the Directors, in 1845, acquired from the late Mr. Robt. France, surgeon, a portion of his garden ground, "bounded by the lead to the Milton Mill on the east side, and on the north by the churchyard wall." The works were erected forthwith, and the following year the houses in Abbeygreen received the benefit of gaslight. In February of that year the price of gas was fixed at 6s. per 1000 cubic feet, and in April, 1847, it was advanced to 7s. 6d. Additional ground was acquired from Mr. France in January, 1850; and in June, 1853, the price of gas was reduced to 6s. 8d. In consequence of the extension of the village, and the increased demand for gas, it was found necessary to have an additional holder, and accordingly ground was secured for the purpose from Mr. Andrew Reid, adjoining the works, in August, 1860, at which date the price of gas was fixed once more at 7s. 6d. In that year the streets were first lighted with gas. The price is now down at 3s. 9d. The capital of the Company was £615, in shares of £1 each. A dividend of 6 per cent. was paid for some time, and then it was reduced to 5 per cent. Mr. W. H. M'Kerracher is now the Manager, and the annual make of gas is between 2 and 3 million cubic feet.

Lord James of Hereford has decided for the coalmasters and coalminers who could not agree upon the subject, that the miners' wages are to be reduced, till July 31 next, by 12½ per cent., which is equal to 6d. per day. The masters asked a reduction of 1s. per day. It seems, to outsiders, strange that the ponderous machinery of conciliation should have been put in motion for the purpose of fixing wages for so short a period; and to many the outcome of so much labour will appear to be ridiculously small. It is called conciliation; but the word is scarcely a proper description of the process. In reality, because they could not arrive at a conciliatory conclusion, the parties were obliged to come to a coercive resolution, and to call in a party to decide for them, whose decision would be binding. There may well be grave doubts as to this method of referring to one man the question of what is to be the pay of thousands of workpeople; but it is their own desire that it should be done. The interest of the public is in ascertaining what benefit they will get. Now, to one who consumes in single tons, the reduction is so small as not to be appreciable. It is only those who deal in thousands of tons who will ever know that there has been a reduction of wages. In accordance with a well-known practice in all occupations, a rise of the men's wages by (say) 12½ per cent. is followed by an advance in price, to the public, of perhaps, 25 per cent.; whereas a reduction in wages leads to very little result in the experience of consumers. So, I am afraid, it is likely to be in this instance. What is gained by the reduction in wages is likely to be absorbed by owners and middlemen, which is a sorry result, because it implies that the miners are to suffer and that the users of coal are not to benefit.

Mr. Charles Hawksley, who has been inspecting the upper reaches of the Rivers Dee, Don, and Avon, for the Town Council of Aberdeen, with a view to reporting upon the best source from which to derive an additional water supply for the city, returned to Aberdeen on Monday afternoon. He was accompanied by Mr. Bain, the Convener of the Water Committee, and Mr. Dyack, the Burgh Engineer. Mr. Hawksley, besides inspecting the ground, took away with him samples of water for analysis. His report will probably take some time to prepare. Meantime, amateur engineers are at work upon the subject, and airing their views in the local press. One of these is to make the intake of

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the water of the Avon, not from the river itself, but from Loch Builg, the outflow from which runs into the Avon. At the spot which has been recommended—Inchrory—it is pointed out that an embankment 200 feet high and a quarter-of-a-mile long would be required; whereas the surface of Loch Builg is only 30 feet below the watershed between the Avon and the Dee, and a dam of 30 feet in height, or a cut 300 yards in length and 30 feet in depth, would take the water into the valley of the Dee. This is the main feature of the scheme propounded by one who says he is not an engineer, but who is familiar with the ground. He thinks it would be much easier to bring the water to Aberdeen by the valley of the Dee than by that of the Don. This is likely, because, apart from the necessity for crossing hill ranges, the existing water-works are in the Dee Valley, and could be utilized. The scheme is worth considering.

CURRENT SALES OF GAS PRODUCTS.

LIVERPOOL, *June* 8.

Sulphate of Ammonia.—There has again been a quiet market, with a further decline in values; the closing quotations being £10 10s. per ton f.o.b. Hull, £10 12s. 6d. f.o.b. Leith, and £10 15s. per ton f.o.b. Liverpool. The quantity offered by makers has not been large; but buyers who have contracts to cover for June delivery are waiting a better opportunity; and meantime direct demand is scarcely sufficient to sustain prices. Makers are still firm at £11 in the forward position; but there are speculative sellers at £10 17s. 6d. per ton for the early months. Buyers, however, are indifferent; and no important business is reported.

Nitrate of Soda is firm in all positions; and spot prices remain at 8s. 7½d. and 8s. 10½d. per cwt., for ordinary and refined qualities respectively.

LONDON, *June* 8.

Tar Products.—The market is generally quiet; but pitch is in very strong demand for forward delivery. The Gaslight and Coke Company are reported to have made large sales, and are not now anxious to place any further quantity for this year. There is, however, not so much activity in the North, owing to the freights being dearer in that quarter. Crude carbolic remains in the same position; but on account of the low prices at which foreign crystals are being offered, consumers are chary of purchasing for July-December. Tar oils are in strong demand, and seem likely to improve during the summer months. Solvent remains unchanged. Business is reported for forward delivery in some fine London makes at fairly good prices. As regards anthracene, there is no business to report; and the position is unchanged. There is a little more inquiry for naphthalene; and this article shows signs of recovery.

The average values obtaining during the week are: Tar, 14s. 6d. to 17s. 6d. Pitch, east coast, 29s. 6d.; west coast, 27s. 6d. Benzol, 90's, 8d. to 10d.; 50's, 8d. to 10d. Toluol, 11d. Crude naphtha, 4d. Solvent naphtha, 1s. Heavy naphtha, 11d. Creosote, 1½d. Heavy oils, 2¼d. Carbolic acid, 60's, 2s. 5d. Naphthalene, 70s. to 80s.; salts, 40s. to 50s. Anthracene, "A," 2½d.

Sulphate of Ammonia.—The market is decidedly quiet, and prices have a downward tendency. The Gaslight and Coke Company have reduced their price to £10 17s. 6d.; but as there are sellers on Beckton terms at £10 11s. 3d., a still further reduction will be necessary if business is to result. Hull is very quiet indeed. There are sellers at £10 10s.; but this price will not tempt consumers to purchase. There is little or no business to report from Leith. Sellers would accept £10 10s.; but there are no buyers. The Liverpool demand has fallen off considerably.

COAL TRADE REPORTS.

From Our Own Correspondents.

Lancashire Coal Trade.—As anticipated last week, the downward move in prices has become general throughout Lancashire, so far as house-fire coals are concerned. As to other descriptions of fuel, colliery proprietors have not considered it expedient to announce any formal reduction, prices for these having already fallen much more in proportion than the official drop of 1s. 8d. per ton in house coals, the average list basis of which is now about 15s. to 15s. 6d. per ton for best Wigan Arley, 13s. to 13s. 6d. for seconds Arley and Pemberton four-feet, and about 11s. 6d. to 12s. for common house-fire coal. The lower qualities of round coal, which are plentiful on the market and only in indifferent demand for steam and forge purposes, have receded quite 2s. to 2s. 6d. per ton from the top, and can scarcely be quoted more than about 10s. 6d. at the pit, with similar qualities from other districts obtainable at under this figure. Engine fuel, also, is in much the same position; and although now that the pits are getting on to short time in some districts, there is not quite so much pressure of surplus output on the market, supplies are in excess of requirements, with the commoner sorts a drug. There has been a drop of 2s. 6d. to 3s. per ton; common slack not averaging more than 6s. 6d. and 7s., and the best qualities 8s. to 8s. 6d. per ton at the pit, with slack from other districts offering at all sorts of prices, from 3s. 6d. and 4s. per ton upwards at the pit. The position with regard to steam and forge coals and engine fuel is that collieries have practically annulled list rates, and meet the market as best they can according to circumstances and special conditions. This to a large extent means that prices have to be fixed from day to day. At a meeting of Lancashire coalowners held in Manchester last week, the question of gas-coal prices was brought forward for consideration. It was reported that a fair number of contracts, including several important ones—such as Liverpool—had been settled on the basis of 2s. 6d. per ton under last year's prices, representing about 11s. to 11s. 6d. per ton for good screened qualities at the pit. Under these circumstances, it was not considered at all necessary that there should be any further concession. There was, indeed, a strong feeling to hold firmly to these terms; and it would seem probable that only under

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very exceptional conditions will any further giving way be entertained. It was reported that no settlement had yet been come to with the railway companies with regard to the locomotive fuel contracts; but it is now generally being recognized that the basis will have to be about 9s. per ton at the pit—representing a drop of 4s. per ton on last year's prices. The shipping demand is only quiet, and low prices are ruling, ranging from 11s. 6d. and 11s. 9d. to 12s. 3d. and 12s. 6d. per ton, according to quality, for steam coals delivered at the ports on the Mersey. Coke is maintaining the slight improvement recently reported. Good washed Lancashire furnace cokes are quoted 12s. to 13s. per ton at the ovens, and foundry qualities from 23s. and 24s. to 25s. and 26s.

Northern Coal Trade.—The coal trade is steady, and there is a strong demand, both for best steam and gas coals, for export; but forward business is not quite so brisk as it was. In the steam coal trade, the inquiry is full. The price of best Northumbrian steam coals may be put as about 13s. per ton f.o.b.; second-class steams being 12s. to 12s. 3d., and steam smalls 5s. to 5s. 3d. The gas coal trade is steady, and the demand for prompt delivery is firm; while for such the quotation is steady at about 10s. per ton f.o.b. Contracts for Copenhagen and one or two smaller places have been entered into; but the prices are dependent on freight, tax, &c. About 9s. per ton f.o.b. may be looked on as the medium price for such contracts. In the coke trade, there is a steady demand. Prices are on the basis of 17s. 6d. to 18s. per ton f.o.b. for best Durham coke for export. Coke for blast furnaces is about 15s. per ton on Teesside. Gas coke is still quoted at 12s. to 12s. 6d. per ton f.o.b. Some of the local gas companies are reducing the price of gas coke for household use.

Scotch Coal Trade.—It is too early yet to form any opinion as to the effect of Lord James's decision to reduce the miners' wages by only 6d. per day, instead of the 1s. which the coalmasters proposed. But, after all, 6d. per day is only about 2d. per ton—a reduction so small that the consumer of coal is not likely to know of it by experience. The betterment of the coal trade will depend upon the general trade of the country. The home demand is reported to be good; while foreign demand is not improving. The prices quoted are: Main 9s. to 9s. 3d. per ton f.o.b. Glasgow, ell 10s. 6d. to 11s. 6d., and splint 10s. 6d. to 10s. 9d. The shipments for the week amounted to 208,200 tons—a decrease of 16,569 tons upon the preceding week, and of 18,015 tons upon the corresponding week of last year. For the year to date, the total shipments have been 3,766,707 tons—a decrease of 578,354 tons upon the same period of last year.

There was a deficit of £10,109 on the Bury and District Joint Water Board's undertaking last year. This falls on nine Local Authorities, the apportionment varying from £4372 in the case of the Corporation of Bury to £182 for the Bury Rural District Council. In addition to those two Authorities, the Corporations of Haslingden and Rawtenstall and the Radcliffe, Ramsbottom, Little Lever, Whitefield, and Tottington Urban District Councils contribute moieties of the deficiency.

Advanced Price of Gas in Manchester.—At the monthly meeting of the Manchester City Council last Wednesday, Alderman Gibson, Chairman of the Gas Committee, moved—"That, in obedience to the instructions of the Council, as set forth in their resolution of the 1st of May, 1901, the price of gas be advanced to consumers by ordinary meters (including public lamps) as and from the 24th of June, 1901, by 3d. per 1000 cubic feet, both in and beyond the city—*i.e.*, from 2s. 6d. to 2s. 9d., and from 2s. 9d. to 3s. per 1000 cubic feet respectively." In doing so, he said: "I have no alternative. I believe it will strike a great blow at the prosperity of the undertaking, from which it will take many years to recover. I believe it is a great injustice to gas consumers, who are having very much more than their natural burden. They have to bear the burden of other people on their shoulders. Altogether I disagree with it; but I move it, because I cannot help myself." The motion was carried.

Municipal Undertakings in New South Wales.—We learn from particulars supplied by Mr. John Plummer, of Sydney, New South Wales, that at the close of the past year only 1,807,522 acres of the 198,848,000 acres forming the State were incorporated. The number of municipalities was 189; their liabilities being £3,059,295, against which there are assets of the estimated value of £3,729,609. Of these, a sum of £2,051,897 is represented by lands, buildings, &c.; and £873,827 by revenue-producing works. There are 17 country municipalities who have their own gas-works; six others are provided with electric lighting plant; water-works have been constructed in nine; and in 27 others water-works have been carried out by the State, the cost being made a charge against each municipality in which the works are situated. Similar works are being constructed in ten other municipalities. The repayments to the State of the cost of these works, with interest, are spread over a period of 100 years, and are met, where necessary, by a special rate.

Bury Corporation Gas Supply.—At the meeting of the Bury Town Council last Thursday, the annual report presented by the Gas Committee showed that the quantity of gas made during the past year was 364,239,000 cubic feet, and that the leakage was 9,085,200 cubic feet, or equal to 2·5 per cent. It had been resolved that the price of gas to consumers within the borough (except the added areas) be 2s. 4d. per 1000 cubic feet, less 1d. discount for prompt payment, and within the added areas and outside the limits of the borough 3s. 1d. per 1000 cubic feet, less 1d. for prompt payment. It was also resolved that 1d. per 1000 cubic feet be allowed in reduction of the price of gas from the amount now standing to the credit of gas consumers. Mr. J. Byrom, in moving the confirmation of the minutes, said the profit on the year's working was £4667, instead of £2500 which was anticipated; but it was not proposed to reduce the price of the gas, because, although the cost of coal would probably go down, there would also be a corresponding decrease in the receipts which would arise from the sale of residuals, while the working cost would be to all intents and purposes the same. The anticipated profit for the current year was £2050. The minutes were confirmed.

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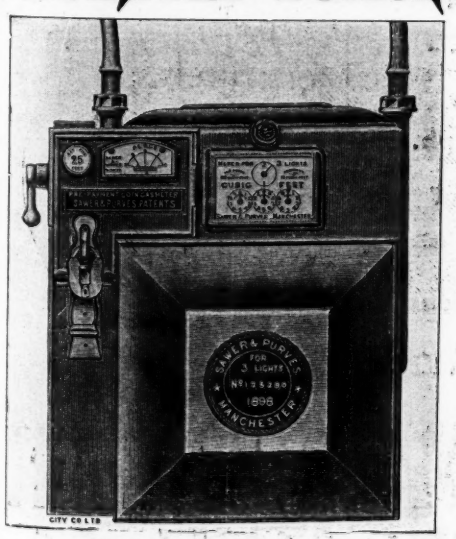

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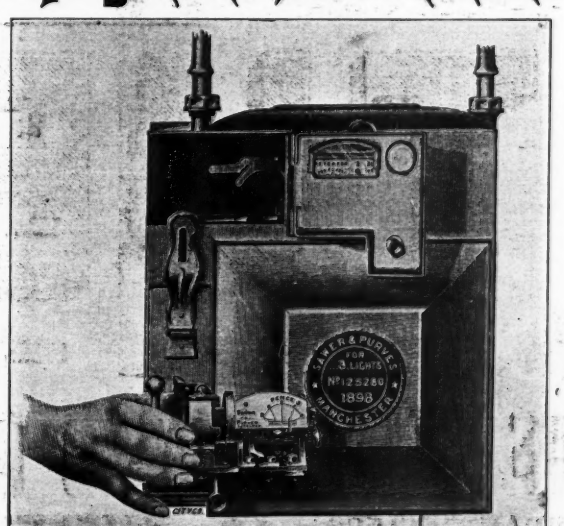

Meter with attachment removed without uncoupling.

Teignmouth District Council and their late Gas Manager.—The late Gas Manager of the Teignmouth District Council (Mr. T. Stormonth) has claimed £50 from that body, made up as follows: Salary for care and supervision of street-lamps, 17 months at £2, £34; salary due for gas-works, 10 days, £2 13s. 4d.; petty cash, postage, &c., 1s. 8d.; fare to Exeter, re meters, &c., 5s.; and outlay on garden, labour, manure, and seeds, £13. The Council have decided to pay £2 3s. 6d. only of the claim, being 6s. 8d. for petty cash, &c., and £1 16s. 10d. for salary due.

A Contribution to the Water Supply of Birmingham.—In the recent annual report of the Birmingham Water Department, it was announced that an arrangement had been effected whereby the East Worcestershire Water Company would, for the period of two years, supply Birmingham with 500,000 gallons of water per day from their new borehole at Washing Stocks, near Bromsgrove, pending the completion of the Elan water scheme. With the object of avoiding delay as much as possible, the Company have during the last ten weeks laid their mains a distance of 5 miles, from the Washing Stocks to Rubery; the additional mile-and-a-half from Rubery to Longbridge having been undertaken by the City Water Department. It was proposed to commence pumping last Saturday.

Costs of the Falmouth Water-Works Purchase Scheme.—A bill for £212 was presented to the Falmouth Town Council last week, the cost of promoting the abortive scheme which the Corporation put forward last year for the purchase of the undertaking of the Falmouth Water Company. Some remarks were made about the engineering costs; and it was explained that the Engineer engaged by the Corporation had received a fee of 85 guineas and expenses. Mr. Grose, who has been the strongest advocate in the Council of the purchase of the water-works, expressed the opinion that the whole sum had been wasted in a "dastardly" way. He should like to know, he said, whether the Corporation would at some future time obtain an Act for the purchase of the water-works. Mr. Thuell thought the question was disposed of as far as this generation is concerned. It was decided to pay the accounts.

Educational Value of the Gas Institute Meetings.—Mr. W. Lowe, a member of the Wigan Corporation, evidently does not possess the quality which Othello was observant enough to recognize in Iago, of weighing his words before giving them breath, for when, at the meeting of that body last Wednesday, he characterized the annual gathering of the Gas Institute as an "outing" and a "picnic," he was promptly called to order by the Mayor (Mr. Fyans), and suffered the humiliation of having to withdraw the offensive terms. Some good, however, came out of the incident; for it enabled Alderman Holmes to offer a few remarks on the value to gas engineers of such gatherings as the meeting in question. He explained that the practice of allowing the Engineer to attend was an institution from which, he thought, the town had benefited for many years. A great deal of information of the very latest character was brought before the meeting; and he did not think the money spent was a loss to the Corporation, but a real gain.

Birmingham Water Consumption.—At the meeting of the Water Committee of the Birmingham City Council last Friday, Mr. Antony Lees, the Secretary, presented a return showing the consumption of water during the past month, compared with the corresponding period last year. The average daily distribution in May was 19,500,000 gallons, or 1,700,000 gallons more than the average daily distribution during May, 1900. On one day last month the quantity of water distributed reached 23,600,000 gallons.

Runcorn Water-Works Finance.—At the meeting of the Runcorn District Council last Thursday, the financial statement in regard to the water-works was submitted by Mr. Pritchard. The income from water-rates during the year was £3447; meters, £1141; and fittings, £167—the total income being £5117. The expenditure having been £5250, there was a loss on the year's working. Mr. Pritchard explained that coal had cost £200 more than usual, and this had had to be covered by a rate of 1d. It was satisfactory, however, that the debit balance had been reduced from £419 to £377.

Carlisle New Water Scheme.—The Carlisle Town Council will have an important matter before them to-day. The tenders for the first contract of the Geltsdale water scheme—comprising the construction of the reservoir and the laying of the mains—have been opened, and the lowest of them exceeds by £25,000 the amount of the Engineer's estimate. This tender only covers two-thirds of the expenditure. The estimates laid before Parliament for the entire work amounted to £129,000; and power was obtained to borrow £130,000, under the belief that this would be ample for all purposes. The cost of the work included in the contract now under consideration was estimated at £88,000; and the lowest tender for it is £113,000. The Committee have naturally been much alarmed at this discovery; and visions have arisen of the Corporation having to face a total expenditure of £200,000 to carry out the scheme.

Southampton Water Supply.—On the advice of the Water Engineer (Mr. W. Matthews), the Water Committee of the Southampton Corporation recommended, at the meeting last Wednesday, an extension of the filtering plant, at a cost of £4800. It was pointed out that the old plant, consisting of 19 filters, could satisfactorily filter as nearly as possible 4 million gallons of water per day, or 8770 gallons per filter per hour. The new pattern filter easily passed 15,300 gallons per hour, or 75 per cent. in excess of that yielded by each old filter. If an extension were made on the old lines, it would necessitate having nine additional filters, for which a new filter-house and clear-water tank would have to be built, and considerable repairs carried out to the existing filters, the total cost of which would be about £5100. If, on the other hand, the new type of filter were adopted, the same result could be obtained by the alteration of 16 of the existing filters, and no new buildings or tanks would be required. The remaining filters could be altered subsequently, when the necessity for further extension arose. The recommendation was adopted, as was also one sanctioning the purchase of about 35 acres of land at Otterbourne, required for the protection of the headings at the water-works.

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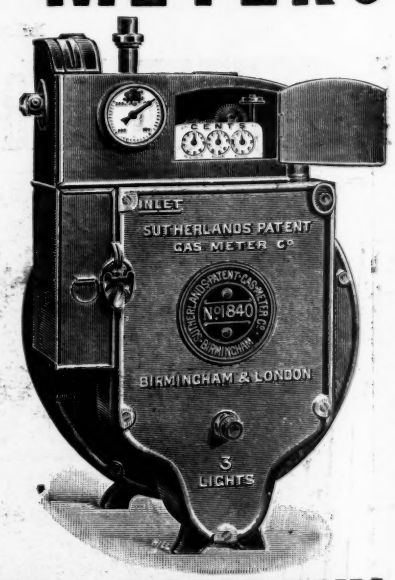

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Downderry Water Supply.—A general holiday was observed at Downderry, Cornwall, on Wednesday last, in celebration of the completion of the works for draining the village and supplying it with water. The water is derived from springs and wells at Deviock; and the scheme, which was carried out from the plans of Messrs. Jenkins and Son, Liskeard, comprised the construction of two reservoirs, each 40 feet long, 20 feet wide, and 11 ft. 6 in. deep. Each of these has a capacity of 50,000 gallons; and as the resident population supplied is only about 150, there is ample provision for the wants of the village, even when the population is doubled or trebled by the influx of visitors in the summer. Mr. R. E. Paige, Chairman of the St. Germans Rural District Council, who turned on the water supply, described the scheme as second to none in England.

A District Councillor Unseated.—On Counsel's advice, the Teignmouth District Council have declared vacant the seat of Mr. Hutchings, a member of that body. Mr. Hutchings is the owner of a vessel chartered on the Tyne to convey a cargo of coal to the Teignmouth Gas-Works, which are the property of the Council. The master of the vessel had general authority to obtain freights from her for Teignmouth, subject to particular instructions not to accept cargoes for the Council. Through some confusion, the cargo was shipped, and though, Counsel said, a very nice question might have arisen as to whether or not Mr. Hutchings could have been held to the contract if he had refused to carry the cargo, as a matter of fact he accepted the freight, and by so doing participated in the profit of the contract within the meaning of the Local Government Act, 1884. Members of the Council expressed great regret that Mr. Hutchings should have lost his seat through a technicality.

Stretford District Council and the Gas Supply.—At the meeting of the Stretford District Council last Tuesday, Mr. J. Williams moved a resolution to the effect that it was expedient that the supply of gas within the district of Stretford should be controlled by the District Council, and that the General Purposes Committee should consider the desirability of acquiring the undertakings of the Stretford Gas Company and the Manchester Corporation so far as they related to the supply of gas within the district of Stretford. He said he was induced to make this proposition by the announcement that the Manchester Corporation intended to increase the price of gas 3d. per 1000 cubic feet. If this had been rendered necessary by increased cost of production, little could be said about it; but owing to the fall in the price of coal, the cost would be considerably less in the coming year than during the past twelve months. The fact that they paid 2s. 9d. per 1000 feet instead of 2s. 3d., as in Manchester, justified them in making inquiries in order to see whether they could not themselves do better for the people they represented. The Chairman, in seconding the motion, said that, out of 31 authorities in Lancashire who supplied gas to outside districts, only 13 had a differential charge for such districts. In Stretford they were contributing largely to the profits of the gas undertakings without receiving any *quid pro quo* in the direction of the relief of rates. The resolution was adopted.

Lancaster's New Reservoir.—The members of the Lancaster Corporation recently paid their annual visit of inspection to the waterworks in the Wyresdale district. The new reservoir at Blea Tarn has just been completed, and will be formally "tapped" shortly. The sum spent on its construction is £50,000, which is £10,000 less than the amount for which borrowing powers were obtained. The capacity of the reservoir is 120 million gallons. Provision is made for drawing off the water at a depth of 15 feet, 30 feet, or 45 feet, and the top of the reservoir will be 80 feet higher than the present service reservoir above the town.

The Result of Delaying a Pipe Contract.—The Manchester Corporation Water Committee have effected a big saving by delaying entering into a large contract for pipes; and there were congratulations over the matter at the meeting of the members last Thursday. On that occasion the fourth and final contract was let for the supply of pipes for the second pipe-line from Thirlmere to Manchester. The contract is for the supply of 15,750 tons of castings, which are to be placed between Grasmere and a point near Kendal. The total weight of metal included in the four contracts is 62,700 tons; and the price, it is estimated, will be about £314,000. When the consent of the City Council to the laying of the second pipe was given, a year or so ago, the price of iron was high as compared with the present market rate. It is calculated that by waiting, and thus having advantage of the drop in the iron market, the Committee have placed their orders in such a way as to effect a saving of nearly £80,000. The reckoning is based on prices which had to be paid for some urgently needed pipes for the Longdendale works while high values prevailed.

Rochdale Gas Supply.—In the report of the Gas and Electricity Committee of the Rochdale Corporation for the past financial year, they state that for the first time for some considerable period the consumption of gas did not materially increase—indeed, for lighting purposes there was an actual decrease of about 1 per cent. This, they say, was doubtless partly attributable to the increase in the price of gas, which came into operation in July last; partly to the fact that trade was not so good last year as during the preceding one; and partly to the more general adoption of Welsbach mantles. The consumption of gas for purposes other than lighting continued to increase; the quantity so used during the period under review being about 93 million cubic feet, against 83 millions for the year ending March 31, 1900. The average cost of coal during the year was 15s. 8½d. per ton, compared with 11s. 4½d. before; and the difference between the two prices would have been still greater but for the fact that the new contract for coals did not take effect until about three months after the commencement of the financial year. The total cost of coal was £42,070, exclusive of enriching material, against £30,603 before—an increase of £11,467. Towards this amount residual products realized £1249 more, and gas-rents £5036 more, than they did in 1899-1900. Residuals realized only 54 per cent. of the cost of coal, against 69·7 per cent. before; and the additional income from these two sources was £5181 less than the increased cost of coal.

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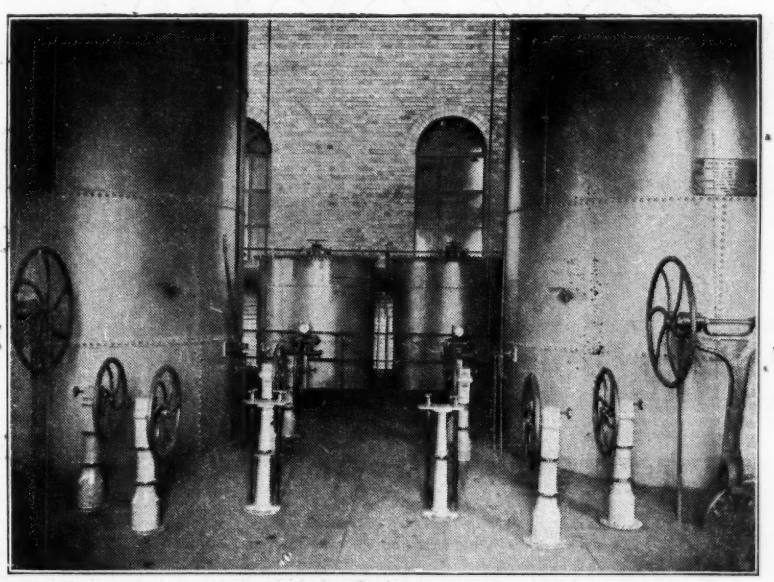

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The Maximum Daily Capacity of the Birmingham Corporation's Plant, which was erected by this Company, is 10 MILLION CUBIC FEET.

Lincoln Water Affairs.—The report of Mr. J. H. Teague, the Corporation Water Engineer of Lincoln, states that the income for the past year was £12,254, as against £11,752 in the previous year. The working expenses amounted to £4938, as compared with £4343; and the debt and interest absorbed £5036, as against £5085. The profit for the year was £2279, against £2324. From the profit a grant of £1500 was made in aid of the district rate. Other requirements absorbed the balance, excepting £141; and this, added to the amount standing to the credit of profit and loss account, makes £4980.

Incandescent Gas Lighting in Austria.—The experience of the Austrian Incandescent Gas-Light Company of Vienna is gradually becoming similar to that of the other Companies operating under the Welsbach patents. During the past year, prices fell in consequence of the expiration of patents, and, notwithstanding the large increase in sales, the profits perceptibly diminished as compared with 1899, though the dividend amounts to the highly respectable figure of 55 per cent. on a capital of 3,000,000 crowns, compared with 65 per cent. the previous year. As far as the new osmium lamp is concerned, upon which many sanguine anticipations have been based, it appears that it was on view towards the close of the Paris Exhibition, and that the German Incandescent Gas-Light Company have purchased the patent rights for half of Germany, Luxemburg, and Holland. The price is 1,173,500 crowns, all of which has been written off for the depreciation of patents. Negotiations are now being completed for the disposal of the patent rights in other countries, among which England was mentioned as being included a few months ago.

Sales of Shares.—At the Mart, Tokenhouse Yard, E.C., last Tuesday, Mr. Alfred Richards offered for sale, by order of the Directors, a new issue of ordinary £10 shares in the Chigwell, Loughton, and Woodford Gas Company. The last dividend on similar shares was at the rate of 7 per cent. They were sold at £13 12s. 6d. and £13 15s. each. On the same occasion a few original £10 shares in the Sevenoaks Gas Company fetched £20 apiece, and some "B" shares (7 per cent.), £14 each. A parcel of £10 "B" shares in the Eastbourne Gas Company (last dividend 11½ per cent.) changed hands at £23 and £23 10s. per share. A new issue of 4 per cent. perpetual debenture stock of the Lowestoft Water and Gas Company was sold at £115, £115 10s., and £116 per £100; and some additional ordinary £10 shares (last dividend on similar shares 5¾ per cent.), at from £12 10s. to £13 apiece. A few £10 "A" shares in the East Grinstead Gas and Water Company, on which 7½ per cent. has been paid, were sold for £15 15s. each; and some "B" and "C" shares of like nominal value (last dividend £5 5s. per cent.), at £11 7s. 6d. each. A small quantity of 5 per cent. converted stock of the Hastings and St. Leonards Gas Company (last dividend 6 per cent.) fetched £120 and £121 per cent. Mr. Roper recently sold some £10 shares in the Sevenoaks Gas Company at prices ranging from £13 15s. to £14 12s. 6d. each. At a sale a few days ago at Barnsley, 58 "F" £10 shares in the Barnsley Gas Company were disposed of at £18 each; some "G" shares, of similar nominal value, at £14 12s. 6d. each; and £231 16s. of general capital stock, at £199 per £100.

Messrs. John Wright and Eagle Range, Limited, have lately been holding exhibitions of their gas cooking-stoves and appliances, with cookery lectures twice daily, at the following places—viz., Newport (Mon.), Newbiggin (Northumberland), Rye (Sussex), Stockbridge (Edinburgh), and Waterford and Lisburn (Ireland).

Dr. P. Dvorkovitz, Editor of the "Petroleum Review," has established a Petroleum Institute, for the training of gentlemen in every branch of science relating to petroleum. It comprises a chemical and mechanical laboratory, an engineering department, a permanent exhibition, and a library and reference department. The laboratory will be opened for analytical and experimental work on the 15th prox.; and a course of lectures on the history, geology, constitution, uses, &c., of petroleum, will begin in October.

"The Automatic Transmission of Material" is the title of an article by Mr. Archibald J. S. B. Little in the current number of "Feilden's Magazine." The author is a son of Mr. Gilbert Little, the founder of the New Conveyor Company (of which he is the Chairman and Managing-Director), and, though quite a young man, has had a good deal of experience in writing for the Technical Press. When only seventeen, he discussed in the columns of the "Daily News" the subject of the antagonism of workmen to labour-saving devices.

The fourth exhibition of gas stoves and appliances promoted by the Burton Corporation was opened in St. George's Hall in that town on Monday evening last week. There was a good attendance. In conjunction with the exhibition, practical lessons on cooking were given during the week. There were three firms exhibiting—viz., the Davis Gas-Stove Company, Limited, Messrs. Fletcher, Russell, and Co., Limited, and John Wright and Eagle Range, Limited. The exhibition was opened by Mr. Tresise, Vice-Chairman of the Gas Committee, who was introduced by the Manager (Mr. F. L. Ramsden); and in a few appropriate remarks he explained its objects. At the close of his speech, the first lecture was given by Miss Gertrude A. Lees. A very successful exhibition, in all respects, was held last week under the auspices of the Lowestoft Water and Gas Company. The exhibitors were Messrs. Fletcher, Russell, and Co., and Messrs. Henry Greene and Sons; and lectures were given by Mrs. Collins. At the close of the exhibition on Saturday night, the Company's Superintendent (Mr. G. Chaston) thanked this lady and the audience for the interest they had manifested in the display and in the lectures, and offered a few suitable remarks on the cheapness of gas as compared with the electric light, as exemplified by a high-power gas-lamp of 900 candles erected outside the hall, which cost 8d. for five hours, and a contiguous arc electric lamp of 1000-candle power which he said he believed could not be maintained for less than 3s. 4d. to 4s. for a similar time. Another exhibition which was attended with good results was held last week by the Wilmslow Gas Company. The appliances were furnished by John Wright and Eagle Range, Limited, and the arrangements were carried out under the superintendence of Mr. W. Severs, the Gas Company's Engineer and Manager. It was opened by the Chairman (Mr. R. L. Bourne); and Miss Maud Sharp gave lectures on cookery.

Telegraphic: "Fortress, Donnington, Salop."

C. & W. WALKER, LTD.

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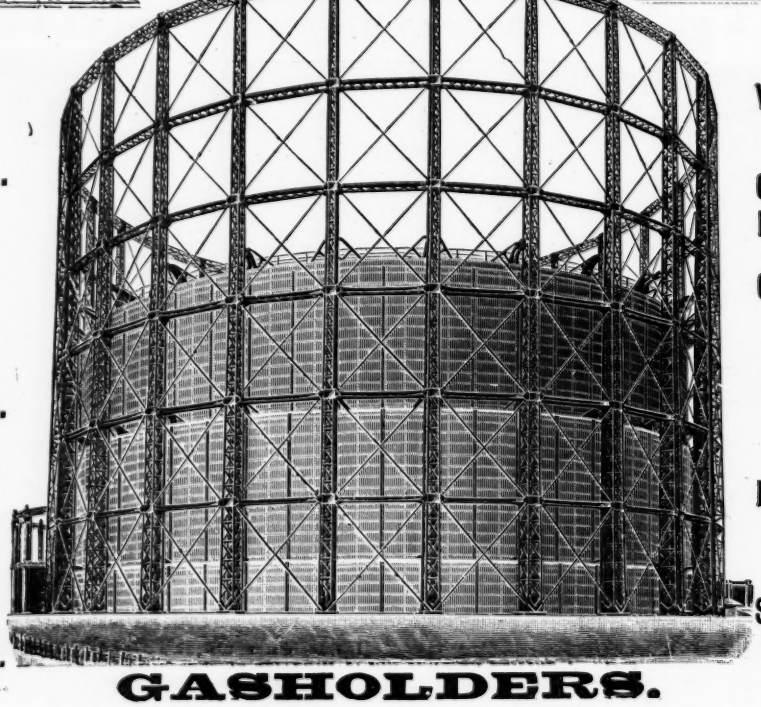

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RETORT-MOUTHPIECES.

SLIDE-VALVES, TAR-BURNERS, SIEVES.

GASHOLDERS.

The Leeds City Council last Wednesday approved the purchase by the Water Committee of certain farms, land, and buildings at Thruscross and Timble, at a total cost of £5750.

It is estimated that the accounts of the Leeds Corporation Water Department for the year ended March 25 last will show a surplus profit of at least £10,000, after paying interest and transferring a large sum to the sinking fund.

Last Tuesday, Mr. P. C. Cowan, Chief Engineering Inspector of the Local Government Board for Ireland, held an inquiry regarding an application by the Bangor District Council for a loan of £4169 required for gas-works extensions.

A useful little card, containing "Twelve Things Worth Knowing," has just been issued by Messrs. Pix and Barnes, Incorporated Accountants, of Broad Street House, E.C. A careful perusal of these few hints may possibly save a business man some annoyance and expense.

Those of our readers who are desirous of applying for some of the 3 and 4½ per cent. debenture stock which, as announced in recent issues of the "JOURNAL," the Kent Water-Works Company are about to issue, are reminded that Friday next is the last day for sending in tenders.

The Borough Council of Birkenhead have approved of an arrangement being made with the Wirral Water Company for a temporary supply of water.

The Whessoe Foundry Company, Limited, have just received an order for a Whessoe-Munich carburetting apparatus from the South Shields Gas Company.

Messrs. Graham, Morton, and Co., Limited, of Leeds, have just finished a complete installation of automatic elevating and conveying machinery at the Royal Mint, London.

The Gas Committee of the Stoke Town Council are so satisfied with the development of their undertaking under the management of Mr. W. Prince, that they have unhesitatingly recommended the Council to raise his salary to £400 a year. This they did at their last meeting.

The Nuneaton and Chilvers Coton Urban District Council at their last meeting gave an order for a Meldrum "Simplex" destructor to be erected at their sewage works, to supply all the power for pumping, &c. Similar plant has been working at the Hereford sewage station for four years, resulting, we are informed, in a saving of £400 to £500 per annum.

NOTICES TO CORRESPONDENTS, ADVERTISERS, AND SUBSCRIBERS.

No notice can be taken of anonymous communications. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a proof of good faith.

COPY FOR ADVERTISEMENTS for the "JOURNAL" should be received at the Office NOT LATER than TWELVE O'CLOCK NOON ON MONDAY, to ensure insertion in the following day's issue.

Orders for Alterations in, or Stoppages of, PERMANENT ADVERTISEMENTS should be received by the FIRST POST on SATURDAY.

TERMS OF SUBSCRIPTION to the "JOURNAL."

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Telephone Number: Holborn 121.

All Communications, Remittances, &c., to be addressed to WALTER KING, 11, BOLT COURT, FLEET STREET, LONDON, E.C.

GAS PURIFICATION AND CHEMICAL COMPANY, LIMITED.

OXIDE OF IRON.

O'NEILL'S Oxide has a larger annual sale than all other Oxides combined. Purity and uniformity of quality guaranteed.
JOHN WM. O'NEILL, Managing Director,
160, 161, & 162, PALMERSTON BUILDINGS,
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ANDREW STEPHENSON, AGENT. All communications re Oxide to the Company as above.

WINKELMANN'S
"VOLCANIC" FIRE CEMENT.
Resists 4500° Fahr. Best for use in GAS-WORKS.
ANDREW STEPHENSON,
182, Palmerston Buildings,
Old Broad Street,
"Volcanism, London." London, E.C.

BROTHERTON & CO.
Offices: Commercial Buildings, LEEDS.
Correspondence invited.

SULPHATE OF AMMONIA
SATURATORS and LEAD WORK for Sulphate of Ammonia Plants.
For REPAIRS or ALTERATIONS, ring up "0848 BOLTON," or Telegraph "SATURATORS, BOLTON."
Largest Practice and most Up-to-Date Works in Britain.
JOSEPH TAYLOR AND CO., Central Plumbing Works, Victoria Square, BOLTON.

GAS TAR wanted.
BROTHERTON AND CO., Tar Distillers.
Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

SADLER & CO., Ltd., Middlesbrough,
Tar Distillers and Tar Colour Manufacturers. BENZOL specially prepared for Gas Enrichment free from Sulphur. Pure Hydrated OXIDE OF IRON for Purifying Gas either for Sale or Lent on Hire. Always Buyers of GAS TAR and AMMONIACAL LIQUOR.

SULPHURIC ACID for Sale.
BROTHERTON AND CO., Chemical Manufacturers.
Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

PENNY-IN-THE-SLOT WORK.
H. GREENE & SONS, Ltd., are prepared to give QUOTATIONS to Gas Companies or Corporations for FITTING UP COMPLETE and CARRYING OUT the WORK in its entirety, either in Iron or Compo.
19, FARRINGDON ROAD, LONDON, E.C.
Telegrams: "LUMINOSITY."

PATENTS FOR INVENTIONS.
Messrs. J. C. CHAPMAN & CO., Chartered Patent Agents, ADVISE ON ALL MATTERS CONNECTED WITH ABOVE.
Information and Handbook on application.
70, CHANCERY LANE, LONDON, W.C.

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JOHN E. WILLIAMS AND CO.,
VICTORIA PAINT WORKS,
MANCHESTER.
For all Joints in connection with Oil Gas Plant and Sulphate Plant.
For all Gas Joints.
For all Tar Joints.
For all Ammonia Joints.

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First-Class Award, Melbourne Exhibition, 1889, for WET AND DRY GAS-METERS, STATION METERS, AND GOVERNORS, PRESSURE-GAUGES, STREET LAMPS AND PILLARS, &c.
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PREPARED from Pure Iron.
Twice as Rich as Bog Ore.
Gives no Back Pressure.
The Cheapest in the Market.
Can be Lent on Hire.
Can be Exchanged for Spent Oxide.
READ HOLLIDAY AND SONS, LTD., HUDDERSFIELD.

AMMONIACAL LIQUOR wanted.
BROTHERTON AND CO., Ammonia Distillers.
Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

TO GAS AND WATER OFFICIALS.
HIGH-CLASS CYCLES at Reasonable and LOW PRICES. Guaranteed and sent on approval. For Cash or Gradual Payments. Catalogue post free. Old Machines Exchanged or Repaired.
MELROSE CYCLE COMPANY, COVENTRY.

PRACTICAL RETORT SETTERS.
GEORGE NUTTALL & CO., 32, Havelock Road, Saltley, Birmingham.
Regenerator or other Furnaces erected to Engineers' own Designs. Best Work Guaranteed. Please write for Estimates.

BY the adoption of Cripps's Bye-Pass VALVES inside your Purifiers, you can relieve the Back-Pressure in the Lower Tiers when the Purifying Material gets hard. They are extremely useful and economical.
Sole Makers: C. & W. WALKER, LIMITED, Midland Iron-Works, Donnington, near Newport, SHROPSHIRE.

THE Advertisers for a Store and Time Keeper for a medium-sized Works near London (No. 3695) THANK THE APPLICANTS, and inform them that THE VACANCY HAS BEEN FILLED.

ADVERTISER (age 34), Thirteen Years' Experience in the Rental Department of the Gas-Light and Coke Company, and Three Years in a Mining Corporation in Johannesburg, is open to an engagement.
BETA, James Hargreave, Esq., 37, Waterloo Street, BIRMINGHAM.

WANTED, a Stoker. Wages, 24s. per Week. Permanency to a suitable Man.
Apply, with References, to the MANAGER, Gas-Works, St. Ives, CORNWALL.

EXPERIENCED Gas Fitter wanted at once.
Apply, stating Wages required, to the GENERAL MANAGER, Gas-Works, MILL HILL, N.W.

WANTED, at once, a competent Gas HOLDER ERECTOR.
Apply to CLAYTON, SON, & CO., LTD., LEEDS, stating Experience, Wages required, and giving References.

MECHANIC and Blacksmith wanted, willing to make himself generally useful on the Works. Applicants must have had experience in an Engineer's Workshop.
State previous Employment, Age, Wages required, and enclosing *copies* of Testimonials, to A. E. LAYTON, Manager, Gas-Works, REDDITCH.

OXIDE OF IRON OF FINEST QUALITY.
BALE'S Special Fire Cement should be used to keep Retorts, Furnaces, &c., in good repair during the heavy Winter Work.
Send for full Particulars to
BALE & CO., 120 & 121, NEWGATE STREET, LONDON, E.C.
Telegrams: "BOGORE, LONDON."
Telephone "277 HOLBORN."

WANTED, One or Two Good Gas-FITTERS, used to routine of Gas-Works Business. Permanent Jobs.
Apply to Mr. G. STEVENSON, Gas-Works, LONG EATON.

WANTED, at once, a reliable Main-LAYER for Country Job (1200 yards of 3-inch Water-Main). Must be a good Jointer.
Apply, by letter, to No. 3704, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

MAIN-LAYER.
THE Brentwood (Essex) Gas Company want, for a period of eight weeks, the services of a thoroughly efficient MAINLAYER.
Apply, enclosing References, and stating Wages required, to the MANAGER.

WANTED, immediately, a competent RETORT SETTER, for Cape Town. Single. Salary, 70s. weekly. Passage paid.
Apply, by letter, with *copy* Testimonials, to CAPE TOWN GAS COMPANY, New Broad Street House, NEW BROAD STREET, E.C.

TWO or Three Draughtsmen required who have gone through the Shops. Those having experience in Structural Work in Gas-Works will be given preference.
Apply to the NEW CONVEYOR COMPANY, LIMITED, Smethwick, BIRMINGHAM.

GAS-STOVE TRADE.
FIRST-CLASS Representative Wanted.
Able to organize and develop business. Must be fully qualified and experienced.
Apply, by letter, to No. 3700, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, a clerk, with a knowledge of Rental Accounts, Shorthand, and Typewriting, for the General Office of a Suburban Gas Company. Commencing Wages, 30s. per week.
Apply, by letter, to No. 3701, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, a Young Man, with experience in GAS OFFICE WORK. One with knowledge of a Gas Company's Show-Room, and competent to advise Consumers on the use of Burners for Lighting, Gas-Fires, Cookers, &c., preferred.
Apply, stating Age, Experience, with Reference, and Wages required, to Mr. BUCKLEY, Engineer and Manager, Gas-Works, FALMOUTH.

QUAKER'S YARD GAS AND WATER COMPANY, LIMITED.
THE Directors of the above Company are open to engage a MANAGER and SECRETARY for their Gas-Works. He must be able to keep the Accounts in the form prescribed by Parliament, and capable of managing the Works in most approved manner. The make of Gas last Year was 8,750,000 cubic feet. The Works are modern, and in a growing District. House, Coal, and Gas found.
Applicants must state Age, Salary required, and full Particulars of previous Situations.
Three Testimonials only will be entertained.
Address, WM. WATKIN LEIGH, Esq., J.P., Glyn Bargoed House, TREHARRIS.
June 6, 1901.

DRAUGHTSMAN.

WANTED, temporarily, a Draughtsman, with thorough experience of Mechanical and Architectural Gas-Works Plans, Estimates, and Quantities.

Apply, stating Age, Wages, and Experience, to No. 3699, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

AUSTRALIA.

RESIDENT Engineer required (under Chief) for Manufacture, Distribution, &c. Age about 30 to 32. Must have had some experience in Water Gas, Control of fairly large Works, and management of Inclined Retorts. Liberal Salary. Residence and First-Class Passage to suitable Applicant.

Address, with full Particulars, No. 3705, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

THE Sutton, Southcoates, and Drypool Gas Company, Hull, invite applications for the position of RESIDENT MANAGER. Annual make of Gas 180 million cubic feet. House, Coal, and Gas free.

State Age and Salary.

Applications, enclosing three Testimonials (only), to be sent to the Chairman not later than the 25th of June, 1901.

By order of the Board,
DAVID WOOD, Secretary.

Offices: St. Mark's Street, Hull,
May 31, 1901.

WANTED, a Gas-Works on Lease or Purchase, by thoroughly practical Gas Engineer. Address No. 3665, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, offers for Nine Volumes of the "JOURNAL OF GAS LIGHTING" (Vols. 26 to 34). Bound in Publisher's Covers. Never been used.

Replies to No. 3706, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

FOR SALE, Cheap—Two Purifiers, 8 ft. square by 4 ft. deep, in good condition, with Valves, Connections, and Lifting Gear.

INQUIRIES for all kinds of SECOND-HAND GAS PLANT will also be esteemed by SAML. WHILE AND SON, 60, Queen Victoria Street, LONDON, E.C.

TO BE SOLD—

SINGLE GASHOLDER, 22 ft. by 10 ft. Four Columns.

One PHOTOMETER by Sugg & Co., with 10-Candle Pentane Apparatus.

Write J. WRIGHT, Bridge House, BLACKFRIARS, E.C.

FOR SALE—One Second-hand Gasholder in good condition, 40 ft. diameter by 14 ft. deep, with Five Cast-Iron Columns and Lattice Girders. This can be offered either erected in Brick Tank to be built to my Drawings, or supplied complete with Steel Tank and fixed ready for work.

For Price and Particulars, apply to
JOHN ANDREWS.

Gas-Works, Langley Mill.

FOR IMMEDIATE SALE.

OWING to the Introduction of Electricity for the Public Lighting, the Sleaford Gas Company, Limited, have FOR SALE, 137 LAMP COLUMNS, BRACKETS, and COPPER LANTERNS. Many of the Lanterns are practically new, fitted with No. 4 Kern Burners, Auto-Taps, and Anti-Vibrators. Also One Large LAMP COLUMN, fitted with Arc Lamp and Three No. 4 Kern Burners, complete.

For Photos, Prices, &c., apply to H. WIMHURST, Engineer and Manager, Gas-Works, SLEAFORD.

SECOND-HAND Station Meters for SALE—

ONE RECTANGULAR STATION METER, 10,000 cubic feet per hour, 10-inch Connections, Two Valves and Water Lute, Clock and Tell-tale, with New Drum.

TWO ROUND STATION METERS, 8000 cubic feet per hour, 9-inch Connections, Two Valves and Water Lute, with New Drums.

ONE ROUND STATION METER, 4000 cubic feet per hour, 7-inch Connections, Two Valves and Water Lute, with New Drum.

ONE ROUND STATION METER, 4000 cubic feet per hour, 6-inch Connections, Three Screw-Down Valves.

TWO ROUND STATION METERS, 3600 cubic feet per hour, 6-inch Connections, Three Valves, one with Cradle, one with New Drum.

ONE ROUND STATION METER, 2400 cubic feet per hour, 4-inch Connections, Four-Way Cock Bye-Pass and Cradle, with New Drum.

Prices and further Particulars on application to JAMES MILNE & SON, LIMITED, Milton House Works, EDINBURGH; or Midland Meter Works, 48, Wellington Street, LEEDS.

BRISTOL GAS COMPANY.

TENDERS FOR GAS COAL AND CANNEL.

THE Directors of the above Company are prepared to receive TENDERS for the supply of their requirements of GAS COALS during the period ending the 30th of June, 1902.

Particulars and Forms of Tender may be obtained on application to the undersigned, to whom also Tenders, sealed and endorsed "Tender for Coal," must be delivered not later than Ten a.m. on Wednesday, the 19th day of June.

JOHN PHILLIPS,
Secretary.

Chief Offices: Canons' Marsh,
Bristol, June 6, 1901.

GAS PLANT for Sale—I can always offer NEW and SECOND-HAND GAS APPARATUS, including Retorts and Fittings, Condensers, Exhausters, Scrubbers, Washers, Purifiers, Gasholders, Tanks, Valves, Connections, &c. Also a few COMPLETE WORKS. Compare Prices and Particulars before ordering elsewhere.

J. F. BLAKELEY Gas Engineer, Thornhill, DEWSBURY.

TENDERS FOR TAR.

THE Gas Committee of the Carnarvon Corporation invite TENDERS for the purchase of the surplus TAR made at their Works during the Twelve Months ending the 31st of August, 1902.

The Tar will be loaded free into Contractor's Tank Trucks on Rail at the Gas-Works Siding, Carnarvon.

Payments: Net Cash Monthly.

Sealed Tenders, endorsed "Tender for Tar," and addressed to the Chairman of the Gas Committee, Guildhall, Carnarvon, to be delivered on or before Friday, the 21st inst.

The Committee do not bind themselves to accept the lowest or any Tender.

Any further Information may be had from the undersigned.

WILLIAM M. RUXTON,
Manager.

Gas Office, Carnarvon,
June 1, 1901.

TENDERS FOR GAS COAL.

THE Gas Committee of the Carnarvon Corporation invite TENDERS for the supply of 2500 Tons of best screened GAS COAL and 200 Tons of screened CANNEL to be delivered free as required, in Trucks on the Gas-Works Siding, Carnarvon, during the Twelve Months ending the 31st of August, 1902.

Sealed Tenders, endorsed "Tender for Coal," and addressed to the Chairman of the Gas Committee, Guildhall, Carnarvon, to be delivered on or before Friday, the 21st inst.

The Committee reserve to themselves the right to divide the quantity into two or more Contracts, and do not bind themselves to accept the lowest or any Tender.

Forms of Tender and Specification may be had on application to the undersigned.

WILLIAM M. RUXTON,
Manager.

Gas Office, Carnarvon,
June 1, 1901.

CORPORATION OF LOUGHBOROUGH.

TENDERS FOR COAL.

THE Gas Committee are prepared to receive TENDERS for the supply of the whole or part of 10,000 Tons of best screened GAS COAL, to be delivered at Loughborough Station at such times, and in such quantities, as may be required during the Year from July 1, 1901, to June 30, 1902.

Tenders to be addressed to the undersigned, and to be delivered not later than Thursday, the 20th day of June, 1901.

The Committee do not bind themselves to accept the lowest or any Tender, and reserve to themselves the power to accept a portion of a Tender.

By order,
EDWARD ONIONS,
Engineer and Manager.

Gas Offices, Loughborough,
June 5, 1901.

CORPORATION OF LOUGHBOROUGH.

TENDERS FOR TAR AND AMMONIACAL LIQUOR.

THE Gas Committee invite Tenders for their surplus TAR and AMMONIACAL LIQUOR for the ensuing Twelve Months ending June 30, 1902.

Estimated amount of Tar, 700 Tons; Liquor, 1000 Tons.

The Contractor to state price for Liquor at 5° Twaddel, and per Ton extra for every ½° above 5°; the Corporation to deliver both Tar and Liquor into Contractor's boats at the Derby Road Wharf, Loughborough.

The Committee do not bind themselves to accept the highest or any Tender.

Tenders to be signed and endorsed "Tenders for Tar," and delivered to the undersigned by Thursday, the 20th day of June, 1901.

By order,
EDWARD ONIONS,
Engineer and Manager.

Gas Offices, Loughborough,
June 5, 1901.

COUNTY BOROUGH OF BURY.

(GAS DEPARTMENT.)

TENDERS FOR GAS COAL.

THE Gas Committee are prepared to receive TENDERS for the supply of
40,000 Tons of GAS COAL,
600 Tons of BURGY,
300 Tons of HOUSE COAL.

Forms of Tender and Conditions of Contract may be obtained on application to Mr. H. Simmonds, Engineer and Manager, Gas-Works, Bury.

Tenders, endorsed "Gas Coal," to be addressed to the Chairman of the Gas Committee, Town Clerk's Office, Bury, and delivered not later than Saturday, the 15th of June next.

The Gas Committee invite TENDERS for the supply and delivery of a TANK LOCOMOTIVE, Standard Gauge.

Further Particulars as to Size, &c., may be had upon application to Mr. H. Simmonds, Engineer and Manager, Gas-Works, Bury.

The Gas Committee further invite TENDERS for the supply and delivery of a SECOND-HAND LOCOMOTIVE.

Tenders, endorsed "Locomotive," to be addressed to the Chairman of the Gas Committee, Town Clerk's Office, Bury, and delivered not later than Saturday, the 15th of June next.

JOHN HASLAM,
Town Clerk.

Corporation Offices, Bank Street,
Bury, May 28, 1901.

NEWARK GAS COMPANY.

TO TAR DISTILLERS AND OTHERS.

THE Directors of the Newark Gas Company are prepared to receive TENDERS for the purchase of the surplus TAR produced at their Works, free on rail, G.N. Rly., or M. Rly., in Purchaser's Tanks, for One Year from the 1st day of July, 1901.

Terms: Cash Monthly.

Further Particulars can be obtained on application to the undersigned, to whom sealed Tenders are to be sent on or before the 25th inst., marked on the outside "Tender for Tar."

The Directors do not bind themselves to accept the highest or any Tender.

By order,
F. B. FOOTTIT,
Secretary.

Newark, June 8, 1901.

NEWARK GAS COMPANY.

TO MANUFACTURING CHEMISTS AND OTHERS.

THE Directors of the above Company are prepared to receive TENDERS for the purchase of the AMMONIACAL LIQUOR produced at their Works, for One Year from the 1st day of July, 1901, at per degree Twaddel (Temperature 60° Fahr.).

The Liquor to be not less than 5° in strength.

Terms: Cash Monthly.

Further Particulars can be obtained on application to the undersigned, to whom sealed Tenders, marked on the outside "Tender for Liquor," are to be sent on or before the 25th inst.

The highest Tender will not be necessarily accepted.

F. B. FOOTTIT,
Secretary.

Newark, June 8, 1901.

SUTTON, SOUTHCOATES, AND DRYPOOL GAS COMPANY, HULL.

THE Directors of the above Company invite TENDERS for the surplus TAR and AMMONIACAL LIQUOR, produced at their Works during the Twelve Months ending the 30th of June, 1902.

Probable quantity of Tar . . . . . 1000 Tons.
" " Ammoniacal Liquor 1200 Tons.

Tenders for Liquor must state price per ton, per degree Twaddel's Hydrometer from 4° to 8°.

Tenders to be sent to the undersigned on or before Twelve o'clock noon, Tuesday, the 25th of June, 1901, marked "Tender for Tar" or "Liquor."

The Directors do not bind themselves to accept the highest or any Tender.

By order,
DAVID WOOD,
Secretary.

Offices: St. Mark's Street,
Hull, June 5, 1901.

THE Directors of the Sutton, Southcoates, and Drypool Gas Company, Hull, invite TENDERS for the supply of 16,000 Tons of best SILKSTONE GAS COAL, stating price for each of the following descriptions: Screened, Unscreened, and Cobbles, for delivery during the Year ending the 30th of June, 1902, in North-Eastern Railway Company's Waggons into this Company's Siding, Dansom Lane, Hull.

The lowest or any Tender will not necessarily be accepted.

Tenders to be sent addressed to the undersigned before Twelve o'clock noon on Tuesday, the 25th of June, 1901, marked "Tender for Coal."

By order,
DAVID WOOD,
Secretary.

Offices: St. Mark's Street,
Hull, June 5, 1901.

MILLOM URBAN DISTRICT COUNCIL.

TENDERS are invited for the supply of 1600 to 2000 Tons of GAS COAL at such times and in such quantities as the Council may require during Twelve Months from the 1st of July next.

The Coal must be of the best quality.

Full Particulars of Coal, Colliery, and Working Analysis to be given.

State Price per Ton delivered free at Millom Station (Furness Railway).

Sealed Tenders on Forms (which can be had on application) endorsed "Tender for Coal," to be sent in to me not later than the 30th inst.

The Council will not be bound to accept the lowest or any Tender.

W. T. LAWRENCE,
Clerk.

Millom, June 4, 1901.

RHONDDA URBAN DISTRICT COUNCIL.

(GAS AND WATER DEPARTMENT.)

TENDERS FOR COALS AND PIPES, &c.

THIS Council are prepared to receive TENDERS for the following:—

(1) The supply from the 1st of July, 1901, to the 30th of June, 1902, of 13,000 Tons of GAS COALS, delivered at Porth and Ystrad Gas-Works.

(2) CAST-IRON PIPES required from the 1st of July, 1901, to the 30th of June, 1902.

(3) LEAD and COMPO. PIPE required for Three months ending the 30th of September, 1901.

(4) RETORTS, FIRE-BRICKS, &c.

Specifications and Forms of Tender can be obtained on application to the Engineer and Manager, Mr. Octavius Thomas, Gas and Water Offices, Pentre, R.S.O., Glam.

Tenders to be addressed to the Chairman of the Gas and Water Committee, endorsed "Tender for Coals," or "Tender for Pipes," &c., as the case may be, and delivered at my Office not later than Thursday, June 27, 1901.

The Council do not bind themselves to accept the lowest or any Tender.

WALTER H. MORGAN,
Clerk.

Council Offices, Pentre, R.S.O.,
Glam., May 30, 1901.

THE Directors of the Kineton Gaslight Coal and Coke Company, Limited, invite TENDERS for the supply of not less than 400 Tons of well-screened SILKSTONE GAS COAL, delivered at their Works as required during Twelve Months from the 1st day of July next.

Tenders to be addressed to the SECRETARY of the Company, Kineton, WARWICK, by June 18.

CORPORATION OF LEICESTER.

GAS COAL.

THE Gas and Electric Lighting Committee of the above Corporation are prepared to receive TENDERS for the supply of COAL, COBBLES, or NUTS, about 180,000 tons, for the Twelve Months ending May 31, 1902.

Particulars and Form of Tender can be obtained on application to the Engineer.

Tenders, addressed to Alderman Lennard, J.P., Chairman, and endorsed "Tender for Gas Coal," to be delivered at these Offices not later than Eleven o'clock a.m. on Saturday, June 15, 1901.

The Committee do not bind themselves to accept the lowest or any Tender.

ALFRED COLSON, M.Inst.C.E.,
Engineer and Manager.

Offices: Millstone Lane, Leicester,
May 31, 1901.

BARNSLEY CORPORATION WATER-WORKS.

(CONTRACT No. 6.)

THE Corporation of Barnsley are prepared to receive TENDERS for the construction of a COVERED SERVICE RESERVOIR at Wortley.

Drawings may be inspected and Specifications, Forms of Tender, and Schedules of Quantities may be obtained (on payment of Two Guineas, returnable if a *bonâ-fide* Tender be made), on application at the Office of the Borough Surveyor in Barnsley, and at the Office of Messrs. T. & C. Hawksley, Civil Engineers, 30, Great George Street, Westminster, S.W., on and after Thursday, the 13th day of June inst.; and Tenders must be delivered at the Office of the Town Clerk, at or before Ten o'clock in the morning of Thursday, the 27th day of June inst.

The Corporation do not pledge themselves to accept the lowest or other Tender.

HENRY HORSFIELD,
Town Clerk.

Barnsley, June 7, 1901.

BARNSLEY CORPORATION WATER-WORKS.

TO PIPE-LAYING CONTRACTORS.

CONTRACT No. 7.

THE Corporation of Barnsley are prepared to receive TENDERS for the laying of about FIVE MILES of CAST-IRON SOCKET PIPES, 22 inches diameter.

The Drawings may be inspected, and Specifications and Forms of Tender may be had on payment of the sum of Two Guineas (to be returned on receipt of a *bonâ fide* Tender), on application at the Office of Messrs. T. & C. Hawksley, Civil Engineers, 30, Great George Street, Westminster, S.W., or at the Office of Mr. J. Henry Taylor, Borough Surveyor, Barnsley, on and after Friday, the 7th inst.; and Tenders must be delivered at my Office, at or before Ten o'clock in the morning of Tuesday, the 25th day of June, inst.

The Corporation do not pledge themselves to accept the lowest or other Tenders.

HENRY HORSFIELD,
Town Clerk.

Barnsley, June 6, 1901.

URBAN DISTRICT COUNCIL OF LYMM.

THE above Council are prepared to receive TENDERS for the supply of CANNEL and best screened GAS COAL, to be delivered at their Gas-Works in Lymm, for a term of Twelve Months from the 1st day of July, 1901.

The probable quantities required will be about 120 Tons of Cannel and about 1600 Tons of Gas Coal, which must be freshly wrought, well screened, and free from Sulphurous Pyrites, and other objectionable matter; but the Council reserve the right of increasing or decreasing the quantities named.

The person whose Tender is accepted will be required to enter into an agreement with the Council for the due performance of his Contract.

Sealed Tenders, stating price per ton delivered alongside the Works, to be sent to the undersigned on or before the 20th day of June, 1901, and endorsed "Coal Tender."

The Council do not bind themselves to accept the lowest or any Tender.

Forms of Tender are not supplied.

Further Particulars may be had on application to the Gas Manager, Mr. W. L. Donaldson.

W. MULLARD,
Clerk.

Council Offices, Lymm,
Cheshire, June 1, 1901.

URBAN DISTRICT COUNCIL OF LYMM.

THE above Council are prepared to receive TENDERS for the purchase of the surplus TAR and AMMONIACAL LIQUOR made at their Gas-Works, for a term of One Year from the 1st day of July, 1901.

The Tar and Liquor will be delivered free into Contractor's boat on the Bridgewater Canal.

The Purchaser will have to enter into an Agreement with the Council for the due performance of his Contract.

Sealed Tenders, stating Price per ton for Tar, and Price per ton for Liquor (5% Twaddel), to be sent to the undersigned on or before the 20th day of June, 1901, endorsed "Tar Tender."

The Council do not bind themselves to accept the highest or any Tender.

Further Particulars may be had on application to the Gas Manager, Mr. Donaldson.

W. MULLARD,
Clerk.

Council Offices, Lymm,
Cheshire, June 1, 1901.

BUXTON URBAN DISTRICT COUNCIL.

TENDERS FOR CANNEL.

THE Gas Committee invite Tenders for the supply of 3500 Tons of CANNEL, to be delivered at their Siding (on the Midland Railway) in Ashwood Dale, Buxton, during the Year ending the 30th of June, 1902.

Forms of Tender and other Particulars may be obtained of Mr. H. Barker, Engineer, Town Hall, Buxton.

Sealed Tenders, endorsed "Tenders for Cannel," to be addressed to the Chairman of the Gas Committee, and delivered not later than Saturday, June 15.

The Committee do not bind themselves to accept the lowest or any Tender.

By order,
JOSIAH TAYLOR,
Clerk.

May 30, 1901.

BUXTON URBAN DISTRICT COUNCIL.

TENDERS FOR TAR AND LIQUOR.

THE Gas Committee invite Tenders for the purchase of the surplus TAR and LIQUOR produced at their Works in Ashwood Dale, Buxton, for One Year commencing from the 30th of June next.

Forms of Tender and other Particulars may be obtained of Mr. H. Barker, Engineer, Town Hall, Buxton.

Sealed Tenders, endorsed "Tenders for Tar and Liquor," to be addressed to the Chairman of the Gas Committee, and delivered not later than Saturday, June 15.

The Committee do not bind themselves to accept the highest or any Tender.

By order,
JOSIAH TAYLOR,
Clerk.

May 30, 1901.

LINCOLN CORPORATION.

(GAS DEPARTMENT.)

TENDERS FOR COAL.

THE Gas Committee of the Lincoln Corporation invite TENDERS for the supply of 26,000 Tons of screened GAS COALS and NUTS, to be delivered during a period commencing the 1st of July, 1901, and terminating the 30th of June, 1902.

Further Particulars and Forms of Tender may be obtained from the undersigned.

Sealed and endorsed Tenders, addressed to the Chairman of the Gas Committee, must be delivered on or before the 15th of June next.

The Committee do not bind themselves to accept the lowest or any Tender.

JNO. CARTER,
Manager.

Gas Offices, Lincoln,
May 30, 1901.

LINCOLN CORPORATION.

(GAS DEPARTMENT.)

TENDERS FOR TAR.

THE Gas Committee of the Corporation of Lincoln are prepared to receive TENDERS for the purchase of the surplus TAR (about 1200 Tons) produced at their Works during the period of One Year commencing on the 1st of July, 1901.

Sealed Tenders, addressed to the Chairman of the Gas Committee, and endorsed "Tender for Residuals," must be delivered at the Gas Offices, Lincoln, on or before the 15th of June next.

The Committee do not bind themselves to accept the highest or any Tender.

Other Particulars may be obtained of the undersigned.

JNO. CARTER,
Manager.

Gas Offices, Lincoln,
May 30, 1901.

HAVERHILL URBAN DISTRICT COUNCIL.

TENDERS FOR COAL.

THE Haverhill Urban District Council invite TENDERS for the supply of 1200 Tons of best Screened GAS COAL (with liberty for the Council to increase the same to a further 200 Tons), to be delivered free at the Haverhill (G.E.R.) Station, in such quantities and at such periods as may be ordered from time to time between the 1st of July next, and the 30th of June, 1902.

No special Form of Tender is provided.

The Council reserve to themselves the right to divide the quantity into two Contracts, and do not bind themselves to accept the lowest or any Tender.

Tenders, endorsed "Gas," to be delivered to me on or before the 22nd day of June, 1901.

THOMAS BATES,
Clerk.

Haverhill, Suffolk,
June 6, 1901.

BOROUGH OF WORKINGTON.

TENDERS FOR GAS COAL.

THE Gas Committee of the Workington Corporation invite TENDERS for the supply in whole or in part of 8000 Tons of good GAS COAL to be delivered free in quantities as required at the L. & N. W. Railway Station, or at the Quay Side, Workington, between July 1, 1901, and July 1, 1902.

Tenders, specifying Description and Quality of Coal offered, Analysis of same, the Pit at which it is raised, and the terms for net Monthly Payment, are to be sent on or before the 17th of June, 1901, to the undersigned, endorsed "Tender for Coal."

Any other Information required may be obtained on application to Mr. George Keyte, Gas Engineer, Gas-Works, Workington.

The Committee reserve the right to divide the above quantity into two or more contracts.

The lowest or any Tender not necessarily accepted.

JOHN WARWICK,
Town Clerk.

Town Hall, Workington,
June 6, 1901.

WILMSLOW AND ALDERLEY EDGE GAS COMPANY.

TENDERS FOR GAS COAL AND CANNEL.

THE Directors of the above Company are prepared to receive TENDERS for the supply of 3500 Tons of Screened or Unscreened GAS COAL, and 1000 Tons of CANNEL, to be delivered at Wilmslow Station between the 1st day of July, 1901, and the 30th day of June, 1902.

The Directors reserve to themselves the right to divide the quantity into two or more Contracts, and do not bind themselves to accept the lowest or any Tender.

Form of Tender may be had from the undersigned, to whom Tenders must be delivered on or before the 20th day of June, 1901.

WM. SEVERS,
Engineer and Manager.

Gas-Works, Wilmslow,
Manchester, June 5, 1901.

BOROUGH OF DEWSBURY.

THE Lighting Committee are prepared to receive TENDERS for the supply and delivery at their Gas-Works Siding, Savile Town, Dewsbury, of the following quantities of screened GAS COAL during a period of One, Two, or Three Years, commencing on the 1st day of July, next:—

First Year, 20,000 Tons Black, and 2000 Tons Cannel.
Second Year, 20,000 " " " 2000 " "
Third Year, 20,000 " " " 2000 " "

Tenders must specify Prices for delivery by Rail, and be made on Forms to be had on application to Mr. Chas. A. Craven, Savile Town Gas-Works, Dewsbury, from whom any further Information can be obtained.

Sealed Tenders, endorsed "Tender for Gas Coal," to be sent to G. Trevelyan Lee, Esq., Town Clerk, Dewsbury, not later than Saturday, the 22nd of June, next.

The Committee do not bind themselves to accept the lowest or any Tender.

By order,
G. TREVELYAN LEE,
Town Clerk.

Town Hall, Dewsbury,
May 31, 1901.

THE Gas Committee of the Leeds Corporation are prepared to receive TENDERS for the Supply of the following ARTICLES, for Twelve Months from date of order:—

	Probable Quantity required.
Best Merchant Iron, at per ton	about 30 Tons.
Best Sheet Iron, at per ton	" 3 Tons.
Best Charcoal Annealed Double Tinned Iron, at per cwt.	" 5 Tons.
Wrought-Iron Grate-Bars, at per cwt.	" 15 Tons.
Steel, at per lb.	" 20 Cwt.
Washers, of various sizes, at per gross	" 250 Gross.
Wrought Nails, at per cwt.	" 3 Cwt.
Cut Nails, at per cwt.	" 10 Cwt.
Gas-Hooks, of various sizes, at per cwt.	" 10 Cwt.
Pipe-Hooks, of various sizes, at per cwt.	" 5 Cwt.
Bolts and Nuts, of various sizes	" 6 Tons.
Iron Rivets, at per stone	" 7 Cwt.
Tin Plates, as per form of Tender	" 100 Boxes.
Pure Tin Ingots, at per lb.	" 50 Cwt.
Screws, of various sizes for Wood and Iron (discount off Price List to be stated)	" 90 Gross.
No. 2 Square Ballast Shovels, at per dozen	" 50 Dozen.
No. 7 Square Coal Shovels, at per dozen	" 50 Dozen.
Cast Steel Charging-Shovels, at per dozen	" 70 Dozen.
Coke-Forks, at per dozen	" 12 Dozen.
Spades, at per dozen	" 3 Dozen.
Shovel Shafts, at per dozen	" 2 Dozen.
Pick-Shafts, at per dozen	" 60 Dozen.
Hammer-Shafts, at per dozen	" 60 Dozen.
Picks, at per lb.	" 10 Dozen.
Hammer-Heads, of various sizes, at per lb.	" 24 Dozen.
Rake-Heads, at per cwt.	" 24 Dozen.
Files, of various sizes, and Re-cutting Files (discount off Price List to be stated)	" 8 Gross.
Trowels, at per dozen	" 10 Dozen.
Galvanized Iron Buckets, at per dozen	" 80 Dozen.
Weed Brooms, Scavenging, at per dozen	" 80 Dozen.
Brushes, of various descriptions (net price)	" 85 Dozen.
India-rubber Goods (net price)	——
Wood Plugs, from ⅜ in. to 24 in.	——
Best Spanish Virgin Pig Lead, at per ton	" 100 Tons.
Virgin Sheet Lead, at per ton	" 60 Cwt.
Lead Tube, at per ton	" 50 Tons.
Genuine White Lead (Walker Parker's)	" 6 Tons.
Genuine Red Lead	" 50 Cwt.
Black Ash	" 12 Cwt.
Good Fine Ground Oil Paints, of various colours, in stiff paste, at per cwt.	" 5 Cwt.
Best Pale Copal Varnish	" 50 Gallons.
Oak Varnish	" 40 Gallons.
Engine Oil, at per gallon	" 2000 Gallons.
Common Oil, at per gallon	" 400 Gallons.
Boiled Linseed Oil, at per gallon	" 150 Gallons.
Raw Linseed Oil	" 100 Gallons.
Pure Turpentine, at per cwt.	" 1 Ton.
Best Refined Engine Tallow, at per cwt.	" 80 Cwt.
Sponge Cloths, at per gross	" 20 Gross.
Cotton Waste (coloured) at per cwt.	" 10 Tons.
Tarred Gaskin, at per cwt.	" 10 Tons.
Portland Cement, at per ton	" 20 Tons.
Soft Soap	" 55 Firkins.

All Articles to be delivered at the Stores, Meadow Lane, or at the Gas-Works, at the price tendered.

Samples of the various Articles may be seen at the Stores Office, Meadow Lane, and Forms of Tender obtained on application to the undersigned.

Endorsed Tenders, addressed to the "Chairman of the Gas Committee," Municipal Offices, Calverley Street, will be received not later than Monday, the 24th inst.

The Committee do not bind themselves to accept the lowest or any Tender.

R. H. TOWNSLEY,
General Manager.

Municipal Offices, Leeds,
June 8, 1901.

ILFORD GAS COMPANY.

THE Directors of the above Company invite TENDERS for the supply of 5,000 Tons of GAS COAL, delivered f.o.r. Ilford Station, G.E.R., or in barge, f.a.s. the Company's Wharf, on the River Roding.

Sealed Tenders, endorsed "Tenders for Gas Coal," addressed to the Chairman, to be sent to the undersigned not later than Monday, June 17, from whom any further Information and Forms of Tender can be obtained.

J. H. BROWN,
Engineer and Manager.

Gas-Works, Ilford,
June 6, 1901.

HUYTON AND ROBY GAS COMPANY.

TENDERS FOR COAL, CANNEL, OR OIL.

THE Directors of the above Company are prepared to receive TENDERS for the supply of about 2200 Tons of GAS COAL in the form of NUTS or SLACK, and 200 Tons of STEAM SLACK.

Also for 300 Tons of best round CANNEL or 60 Tons of SCOTCH SHALE OIL for Gas Enrichment by the Peebles Process.

To be delivered during the Year ending June 30, 1902, in the Company's Private Siding at Huyton Quarry.

The Company will provide their own Waggons for the transit of the greater portion of the Coal.

Tenders, specifying the description of the Coal, the name of the Pit from which it is to be raised, and duly endorsed, may be sent in to the undersigned not later than Saturday, the 15th inst.

By order.
FRED. PRITCHARD,
Secretary and Manager.

Gas Office, Huyton Quarry,
Near Liverpool, June 7, 1901.

BOROUGH OF LEIGH.

(GAS AND WATER DEPARTMENTS.)

THE Gas and Water Committee of the above Corporation are prepared to receive TENDERS for the supply of the following Goods:

1. COAL and CANNEL.
2. CAST-IRON PIPES and SPECIALS.
3. WROUGHT-IRON TUBES and FITTINGS.
4. LEAD PIPE.
5. GAS-METERS.
6. VITRIOL.
7. LIME.

Forms of Tender and further Particulars may be obtained on application to Mr. J. Foster, Gas and Water Manager, Leigh.

Sealed and endorsed Tenders must be delivered to the undersigned on or before Twelve o'clock Noon on Saturday, the 22nd day of June next.

The Corporation do not bind themselves to accept the lowest or any Tenders, and reserve to themselves the right to divide any Tender.

By order,
PEREGRINE THOMAS,
Town Clerk.

Town Hall, Leigh, Lancs.,
June 3, 1901.

GLASGOW CORPORATION.

(GAS DEPARTMENT.)

NEW PROVAN GAS-WORKS.

THE Corporation of Glasgow invite TENDERS for providing and erecting Six Sets of PURIFIERS and the IRONWORK of the Purifier-Shed, required in connection with their new Provan Gas-Works.

The Plans and Drawings may be seen, and copies of the Specification and Form of Tender obtained, upon application to Mr. W. Foulis, the Engineer, at his Office, 45, John Street, Glasgow, upon payment of One Guinea, which will be returned on receipt of a *bonâ-fide* Tender.

Sealed Offers, endorsed "Gas Department—Tender for Purifiers," must be lodged with the Subscriber on or before Tuesday, the 25th curt.

All Offers must remain open for a period of Thirty Days from the date thereof, and the Corporation do not bind themselves to accept the lowest or any Offer.

J. D. MARWICK,
Town Clerk.

City Chambers, Glasgow,
June 5, 1901.

BOROUGH OF RICHMOND, SURREY.

WATER-WORKS AND PUBLIC BATHS.

TENDERS FOR SMOKELESS WELSH STEAM COAL.

THE Town Council of the Borough of Richmond, Surrey, invite TENDERS for the supply of about 1500 Tons of best WELSH SMOKELESS STEAM COAL, to be delivered in Barges of about 40 Tons alongside the Wharf opposite the Water-Works, Richmond, for One Year from the 1st day of July, 1901, to the 30th day of June, 1902.

The Seam and District from which the Coal is to be supplied must be stated in the Tender.

Particulars and Forms of Tender can be obtained of Mr. W. G. Peirce, Borough Water-Works Engineer, at the Water-Works.

No Tender will be recognized unless it is made on the prescribed form, properly filled up in every respect, and no Expenses or Claim will be allowed or paid to any person whether tendering or not.

The Security stipulated by the Public Health Act, 1875, for the due performance of the Contract will be required. The Contract and Bond will be prepared by the Town Clerk.

Sealed Tenders, endorsed "Tender for Welsh Coal," and addressed to the Chairman of the Water Committee, Borough of Richmond, Surrey, must be delivered at the Town Clerk's Office by Ten o'clock, on Monday, the 24th of June, 1901.

The Council do not bind themselves to accept the lowest or any Tender.

FREDK. B. SENIOR,
Town Clerk.

Town Clerk's Office, Town Hall,
Richmond, Surrey, June 5, 1901.

THE Directors of the Knutsford Light and Water Company invite TENDERS for the supply of 1800 Tons of the best GAS COAL (Screened) and 400 Tons of best GAS CANNEL, and 50 Tons of best hand-picked LIME, to be delivered during the Year ending May 31, 1902, at Knutsford Station.

Tenders to be sent in to the Chairman of the Company, Knutsford, not later than the 20th inst.

The Company do not bind themselves to accept the lowest or any Tender.

THE Newtown and Llanllwchaiarn Urban District Council are prepared to receive TENDERS for the supply of COAL required at their Gas-Works during One, Two, or Three Years from the 1st of July next.

Tenders, endorsed "Coal," to be delivered not later than noon on Monday, June 17, 1901.

Particulars and Forms of Tender on application to Mr. W. A. M. Valon (Consulting Engineer), 140 and 141, Temple Chambers, Temple Avenue, London, E.C., or to

MARTIN WOOSNAM,
Clerk to the Council.

Council Offices, Newtown,
North Wales, June 25, 1901.

STOCKTON-ON-TEES CORPORATION.

TENDERS FOR GAS COAL.

THE Gas and Electricity Committee of the above Corporation invite TENDERS for the supply, in whole or in part, of 30,000 Tons of GAS COAL, for delivery in weekly quantities as may be required by the Gas Manager.

Tenders, sealed and endorsed "Tenders for Gas Coal," to be sent in not later than noon of the 22nd day of June, 1901, addressed to the undersigned, at the Gas-Works.

The Gas and Electricity Committee do not bind themselves to accept the lowest or any Tender.

WM. FORD,
Manager.

TENTERDEN GAS COMPANY.

COAL.

TENDERS invited for the supply of 550 Tons of best GAS COAL, delivered at the following Stations:—

Tenterden (Rother Valley Light Railway), Headcorn and Appledore (S.E. & C.R.); 400 Tons to be delivered in July and August next, and the remainder as and when required.

Tenders, with Analysis and full Particulars of the Coal offered, to be sent to me on or before Three p.m. Monday, the 17th of June inst.

The lowest or any Tender not necessarily accepted.

GEO. F. VARTY,
Secretary.

Tenterden, June 3, 1901.

CORPORATION OF LANCASTER.

(GAS DEPARTMENT.)

TENDERS FOR GAS COAL.

THE Gas Committee are prepared to receive TENDERS for the supply of screened GAS COAL, to be delivered on the Gas-Works Siding, Lancaster, in such quantities and at such times as may be required, during a period of One Year, commencing delivery July 1 next.

Sealed Tenders, endorsed "Gas Coal," giving full Particulars of the Coal offered, must be delivered to T. Cann Hughes, Esq., Town Clerk, Lancaster, on or before June 15 next; any further Information and Forms of Tender may be obtained on application to the undersigned.

C. ARMITAGE,
Manager.

Gas-Works, Lancaster,
June 1, 1901.

URBAN DISTRICT COUNCIL OF PONTYPRIDD.

(GAS DEPARTMENT.)

THE Gas Committee invite Tenders for the following:—

CONTRACT No. 5—IRONWORK for RETORT-BENCH EXTENSION.
" " IRONWORK for EXISTING BENCHES.

The Drawings may be seen, and copies of Specification and Form of Tender obtained, on application to the Gas Engineer, Mr. Edward Jones, Gas Offices, Treforest, on payment of One Guinea, returnable on receipt of *bonâ-fide* Tender.

Sealed Tenders, endorsed "Contract No. 5 Retort Ironwork," to be sent to the undersigned not later than Tuesday morning, June 18, 1901.

C. SYDNEY WATSON,
Clerk to the Council.

Council Chambers, Pontypridd,
May 31, 1901.

SHREWSBURY GASLIGHT COMPANY.

TENDERS FOR COAL.

THE Directors of the Shrewsbury Gas- light Company, invite TENDERS for the supply of about 16,500 Tons of screened GAS COALS, to be delivered free at the Great Western or London and North-Western Goods Yard, Shrewsbury, during the Year, commencing July 1, 1901, and ending June 30, 1902.

The Directors reserve to themselves the right to divide the quantity into two or more Contracts, and do not bind themselves to accept the lowest or any Tender.

Tenders must be made on Forms (containing further Particulars) which may be obtained on application at the Company's Works, or by post, and must be sent to the undersigned, on or before the 15th day of June, 1901.

By order,
WM. BELTON, Assoc.M.Inst.C.E.,
Engineer, Secretary, and Manager.

Gas-Works, Shrewsbury,
May 7, 1901.

SEAFORD GAS COMPANY.

TENDERS FOR GAS COAL.

THE Directors of the above Company invite TENDERS for the supply of 1000 Tons of GAS COAL, more or less, delivered free on Trucks at Seaford Railway Station as required, in quantities of not less than Ten Trucks, from July 1, 1901, to June 30, 1902.

Tenders to be sent in not later than June 25.

The Directors do not bind themselves to accept the lowest or any Tender.

JAMES COWNEY,
Manager and Secretary.

Gas Office, Seaford.

TO COLLIERY PROPRIETORS.

THE Corporation of Haverfordwest invite TENDERS for the supply of about 1400 Tons of Double Screened GAS COAL of the very best quality, to be delivered at the Haverfordwest Railway Station, or at the Gas-Works Quay, Haverfordwest, by Water Communication, in quantities as required by the Gas Manager during the Year commencing on the 24th of July next.

Tenders by Friday, the 13th day of July, 1901.

Forms of Tender and further Particulars of

R. T. P. WILLIAMS,
Town Clerk.

Council Chamber, Haverfordwest,
June 7, 1901.

BOROUGH OF SMETHWICK.

TENDERS FOR GAS COAL.

THE Gas Committee invite Tenders for the supply of about 30,000 Tons of screened and unscreened GAS COAL, and screened and washed NUTS (Coal and Cannel) for delivery during the Year ending June 30, 1902.

Form of Tender and further Information may be obtained of the undersigned.

Sealed Tenders, endorsed "Tender for Coal," and addressed to the Chairman of the Gas Committee, Town Hall, Smethwick, to be sent in not later than the 27th of June inst.

The Committee do not bind themselves to accept the lowest or any Tender.

By order,
(Signed) W. J. STURGES,
Secretary.

Gas Offices, Town Hall,
Smethwick, June 8, 1901.

CORPORATION OF MANCHESTER.

TENDERS FOR COAL AND CANNEL.

THE Gas Committee are prepared to receive OFFERS of high-class CANNELS and COALS suitable for Gas Making, for delivery at their Gaythorn, Rochdale Road, and Bradford Road Works, during a period of One, Two, or Three Years, commencing the 1st of August, 1901.

Printed Forms of Tender may be obtained on application (in writing only) to Mr. Charles Nickson, Superintendent, Gas Department, Town Hall, Manchester; and Tenders, endorsed "Tender for Cannel" or "Coal," as the case may be, must be delivered at the Gas Department, Town Hall, Manchester, before Ten o'clock on Thursday morning, the 20th of June, addressed to the Chairman of the Gas Committee.

By order of the Gas Committee,
WM. HENRY TALBOT,
Town Clerk.

Town Hall, Manchester,
June 3, 1901.

BRIDGNORTH CORPORATION GAS-WORKS.

TO COLLIERY PROPRIETORS AND OTHERS.

THE Gas Committee are prepared to receive Sealed TENDERS for the supply of GAS-COAL, including carriage to the Bridgnorth Railway Station, for One Year from, or soon after the end of, July next.

Evidence as to quality of Coal must accompany each Tender.

Quantity required: About 2200 Tons per annum in proportionate deliveries as directed, say 70 per cent. during Winter Months, and 30 per cent. during Summer Months.

Sealed and Marked Tenders must be sent to the undersigned not later than Monday, the 17th of June.

The Committee reserve to themselves the right to divide the quantity into two or more Contracts, and do not bind themselves to accept the lowest or any Tender.

Official Forms for Tender are not furnished.

By order,
J. H. COOKSEY, Town Clerk,
Secretary.

Bridgnorth, June 7, 1901.

COUNTY BOROUGH OF WIGAN.

(GAS DEPARTMENT.)

THE Gas Committee invite Tenders for—

(*a*) POWER STOKING MACHINERY (Charging and Drawing), with Elevators, Conveyors, Hoppers, &c., complete.

(*b*) HOT COKE CONVEYORS, ELEVATORS, &c., complete.

Separate Tenders for each section of the work to be sent in.

Drawings and Specification, delineating a complete scheme for manipulating the Coal and Coke between the Railway Waggons and the Coke Storing Yard, to accompany the Tenders.

The Engineer will be pleased to afford intending Contractors every facility for obtaining any Information they may require, on application being made to him.

Tenders sealed, and endorsed "Stoking Machinery," and "Coke-Conveyors," respectively, to be delivered to Harold Jevons, Esq., Town Clerk.

The Drawings and Specification to be addressed to the Engineer, endorsed respectively, as above, on or before Monday, the 19th of August, 1901.

JOS. TIMMINS,
Engineer.

Wigan, June 7, 1901.

THE Urban District Council of Atherton invite TENDERS on or before Wednesday, June 12 inst., for the supply during Twelve Months from the 1st of July next, of 6000 Tons of screened GAS COAL or NUTS.

Forms of Tender and further Information may be had on application to

WM. GARNETT,
Deputy Clerk.

Town Hall, Atherton,
June 1, 1901.

GREAT WIGSTON GAS COMPANY.

TENDERS FOR TAR.

THE Directors of the above Company invite TENDERS for their surplus TAR for the Year ending June 30, 1902.

Coal carbonized 3000 Tons.

The Directors do not bind themselves to accept the lowest or any Tender, not later than June 17.

JOHN A. HARRIS,
Engineer and Manager.

COUNTY BOROUGH OF OLDHAM.

THE Oldham Corporation Gas-Works Committee are prepared to receive TENDERS for the supply of about 124,000 Tons of COAL and CANNEL required by them during the Year ending the 30th of June, 1902.

Specification and Forms of Tender can be obtained on application to Mr. Arthur Andrew, Gas and Water Offices, Oldham, to whom Tenders are to be sent on or before Tuesday, the 18th of June.

A. NICHOLSON,
Town Clerk.

Oldham, May 24, 1901.

COUNTY BOROUGH OF OLDHAM.

THE Gas-Works Committee invite TENDERS for the TAR and AMMONIACAL LIQUOR to be produced at their different Gas Stations, for a period of One Year, commencing the 1st of July next.

The Yearly make of Tar is about 8000 Tons and of Ammoniacal Liquor about 2,500,000 gallons.

Particulars and Forms of Tender can be obtained on application to Mr. Arthur Andrew, Gas and Water Offices, Oldham, to whom Tenders are to be sent on or before Tuesday, June 18, 1901.

A. NICHOLSON,
Town Clerk.

Oldham, May 20, 1901.

CITY OF RIPON.

THE Gas Committee of the Ripon Corporation invite TENDERS for the supply of 4000 Tons of GAS COAL, to be delivered at the Gas-Works, Ripon.

For further Particulars, apply to the Manager, Gas-Works, Ripon.

Tenders to be sent in to me on or before the 2nd day of July next.

The acceptance of the lowest or of any Tender is not guaranteed.

By order,
M. KIRKLEY,
Town Clerk.

Town Hall, Ripon,
June 7, 1901.

OAKHAM GAS COMPANY, LIMITED.

THE Directors of the above Company invite TENDERS for the supply of 1000 Tons of good screened GAS COAL for the ensuing Twelve Months.

Particulars and Form of Tender may be had on application to the undersigned.

Tenders to be sent in on or before Tuesday, June 18, 1901, addressed to the Chairman.

The Directors do not bind themselves to accept the lowest or any Tender.

JAS. MASON,
Manager.

Gas Office, Oakham,
June 8, 1901.

CHELTENHAM GASLIGHT AND COKE COMPANY.

TENDERS FOR GAS COAL.

THE Directors of the Cheltenham Gaslight and Coke Company invite TENDERS for the supply of COAL for a period of Twelve Months from the 1st of July next.

Particulars may be obtained from the undersigned, to whom Tenders, endorsed "Tender for Coal," must be delivered on or before Thursday, the 20th inst.

The lowest or any Tender will not necessarily be accepted.

R. O. PATERSON,
Engineer and General Manager.

Gas-Works, Cheltenham,
June 1, 1901.

BOROUGH OF SAFFRON WALDEN.

TENDERS FOR COAL.

THE Gas and Water Undertaking Committees of the Town Council are prepared to receive TENDERS for the supply of about 1350 Tons of Best Screened GAS COAL, and about 180 Tons of Best Hand-picked HARD STEAM COAL respectively, for the Twelve Months ending June 30, 1902.

Full Particulars can be obtained on application to Mr. A. H. Forbes, Borough Surveyor.

Sealed Tenders, endorsed "Tender for Gas Coal," or "Tender for Steam Coal," as the case may be, to be addressed and sent to me, the undersigned, not later than Five o'clock in the afternoon, on Monday, the 24th day of June inst.

The lowest or any Tender will not necessarily be accepted.

W. ADAMS,
Town Clerk.

Saffron Walden,
June 8, 1901.

PENRITH URBAN DISTRICT COUNCIL.

THE Gas Committee of the above Council are prepared to receive TENDERS for the supply of COAL and CANNEL during Twelve Months commencing the 1st of July, 1901.

Particulars, with Form of Tender, may be obtained on application to the Manager.

Tenders must be delivered to Mr. Wainwright, Public Offices, Penrith, not later than the 22nd of June, 1901.

E. SHAUL,
Manager.

Gas-Works, Penrith,
June 8, 1901.

LONG EATON GAS COMPANY, LIMITED.

TENDERS FOR COAL.

THE Directors of the above Company invite TENDERS for the supply of GAS COAL and CANNEL for One Year commencing July 1 next.

Form of Tender and Conditions may be obtained on application to the undersigned.

The Directors do not bind themselves to accept any Tender.

G. STEVENSON,
Secretary and Manager.

Gas-Works, Long Eaton,
May 30, 1901.

READING GAS COMPANY.

TAR.

THE Directors of the Reading Gas Company invite TENDERS for the purchase of their surplus TAR for One Year, commencing on the 1st of July next.

Specifications for the Contract will be forwarded on application.

Railway communication direct to the Works.

Tenders, endorsed "Tender for Tar," must be delivered not later than Monday, the 17th of June, to

ARTHUR H. CANE,
Secretary.

7, King Street, Reading,
May 31, 1901.

BOROUGH OF EVESHAM.
(GAS DEPARTMENT.)

TENDERS FOR GAS COAL.

THE Corporation invite Tenders for the supply of from 1000 to 2000 Tons of best screened GAS COAL, during the Year ending the 30th of June, 1902, to be delivered on Rail at Evesham.

Tenders to be sent in to me not later than the 29th of June inst., to include full Description and Particulars as to Coal and Price.

No Forms of Tender supplied.

The Corporation do not bind themselves to accept the lowest or any Tender.

THOS. COX,
Town Clerk.

Town Clerk's Offices,
Evesham, June 5, 1901.

ILKLEY URBAN DISTRICT COUNCIL.
(GAS DEPARTMENT.)

THE Gas Committee of the above Council invite TENDERS for the supply of 8000 Tons of best screened GAS COAL, to be delivered at Ilkley Station, during the next Twelve Months ending July 31, 1902, in such quantities monthly as may be required.

Sealed Tenders, addressed to the Chairman of the Gas Committee, and endorsed "Tender for Coal," must be delivered not later than Thursday, the 27th day of June, 1901.

The lowest or any Tender not necessarily accepted.

By order,
WM. EVERITT,
Manager.

N.B.—Tender Forms on application at the Gas Offices, Leeds Road, Ilkley.

SOUTHWARK AND VAUXHALL WATER COMPANY.

TO COAL MERCHANTS.

THE Directors invite Tenders for the supply at their several Stations of about 30,000 Tons (more or less) of COAL during the Year ending June 30, 1902.

Specification and Form of Tender may be obtained at the Office of the Engineer, and the same must be sent in not later than the 17th of June next, addressed to the Chairman, Southwark and Vauxhall Water Company, Southwark Bridge Road, London, S.E., endorsed "Tender for Coal."

The Directors do not bind themselves to accept the lowest or any Tender.

SOUTHWARK AND VAUXHALL WATER COMPANY.
May 30, 1901.

SOWERBY BRIDGE URBAN DISTRICT COUNCIL.
(GAS DEPARTMENT.)

TENDERS FOR COAL AND CANNEL.

THE Gas Committee are desirous of receiving TENDERS for 14,200 Tons, or less, of COAL, and 1200 Tons of CANNEL, required for the Gas-Works at Sowerby Bridge and Luddenden Foot for the Year ending May 31, 1902.

Specifications and Forms of Tender may be obtained on application to Mr. J. Marsland, Engineer and Manager, Gas-Works, Sowerby Bridge.

The Gas Committee do not bind themselves to accept the lowest or any Tender.

Tenders must be sent in not later than Wednesday, June 12, 1901, endorsed "Tender for Coal" or "Cannel," and addressed to

R. W. EVANS,
Clerk to the Council.

Commercial Bank Chambers,
Halifax, May 30, 1901.

SALES BY AUCTION OF GAS AND WATER STOCKS AND SHARES.

MR. ALFRED RICHARDS begs to notify that his AUCTIONS of STOCKS and SHARES in London, Suburban, and Provincial Gas and Water Companies are held PERIODICALLY, at the Mart, Tokenhouse Yard, E.C.

He also undertakes the issuing by AUCTION of GAS and WATER STOCKS and SHARES under Parliamentary Powers.

Terms for issuing such Capital, and also for including Gas and Water Stocks and Shares in these periodical Sales, can be obtained on application at Mr. ALFRED RICHARDS' OFFICES, 18, FINSBURY CIRCUS, E.C.

By order of the Directors of the
ALDERSHOT GAS AND WATER COMPANY.

360 £10 FIVE PER CENT. "E" PREFERENCE SHARES.

MR. ALFRED RICHARDS will Sell the ABOVE BY AUCTION, at the Mart, E.C., on Tuesday, June 18, at Two o'clock, in Lots.

Particulars of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

HORNSEY GAS COMPANY.

440 "A" STOCK.

MR. ALFRED RICHARDS will Sell the ABOVE BY AUCTION, at the Mart, E.C., on Tuesday, June 18, at Two o'clock precisely, in Lots.

Particulars of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

ALL PARTS FOR

GAS-METERS,

INDICES, CRANKS, WORMS, &c.

PREPAYMENT ATTACHMENTS.

Supplied by the

Tourtel Manufacturing Co., Ltd.,

146A, QUEEN VICTORIA STREET, E.C.

HEATHCOTE GAS COAL.

Rich in Illuminating Power and Yield of Gas.
Above the Average in Weight and Quality of Coke.
Maintains a High Standard in Residuals.

THE GRASSMOOR CO., LD.,
CHESTERFIELD.

HYDRAULIC BLOWER

For blowing Air into Gas Purifiers for the purpose of

REVIVIFYING THE FOULED OXIDE.

Full Particulars on application.

LUXWERKE LUDWIGSHAFEN AM RHEIN.

JAMES OAKES & CO.

ALFRETON IRON-WORKS, DERBYSHIRE,
AND
Wenlock Iron Wharf, 21 & 22, Wharf Road, CITY ROAD, LONDON, N.,

Manufacture and keep in Stock at their Works (also large stock in London)

PIPES and CONNECTIONS, 1½ to 48 inches in diameter, and make and erect to order RETORTS, PURIFIERS and TANKS, with or without planed joints, COLUMNS, GIRDERS, SPECIAL CASTINGS, &c., required by Gas, Water, Railway, Telegraph, Chemical, Colliery, and other Companies.

NOTE.—Makers of HORSLEY'S PATENT SYPHONS. These are cast in one piece, without Chaplets; doing away with Bolts, Nuts and Covers, and rendering Leakage impossible.

NEWBATTLE CANNEL.

Highest Results in Gas, & Excellent Coke.

QUOTATIONS ON APPLICATION TO

THE LOTHIAN COAL COMPANY,

LIMITED,

NEWBATTLE COLLIERIES,

DALKEITH N.B.

HOLMSIDE

GAS COALS.

Present Daily Produce over 5000 Tons.

Latest Analysis—By CHARLES PHILLIPS, Gas Examiner to Rotherham Corporation

Yield of Gas per Ton . . . 11,205 Cubic Feet.
Illuminating Power 16 $\frac{Y}{10}$ Stand. Sperm Candl.
Coke (of good & pure quality) 13$\frac{3}{4}$ Cwt. per Ton.
Sulphur . . . . . A little over 1 per Cent.
Ash . . . . . Under 1 per Cent.
Tar . . . . . 163 lbs. (Avoir.) per Ton.
Ammoniacal Liquor 103 lbs. (Avoir.) per Ton.

HOLMSIDE GAS COALS are supplied to the largest Gas Companies in England and on the European Continent; London alone consuming about half the produce.

SOUTH MOOR

PELTON GAS COALS.

Present Daily Produce available 3000 Tons.

Of equal quality to the "Holmside" Coal, and also very largely used by many Gas Companies at Home and Abroad.

Both descriptions are shipped at Tyne Docks, and Dunston Staiths, River Tyne, also at North and South Docks, Sunderland.

These Coals may be bought through the Principal Merchants in England, or direct from

MR. MARK ARCHER,

HOLMSIDE & SOUTH MOOR OFFICES, NEWCASTLE-UPON-TYNE.

DISPENSE WITH CANNEL COAL
and
INCREASE YOUR ILLUMINATING POWER
by using the

WHESSOE-MUNICH BENZOL CARBURETTER

The Cheapest and Best in the Market.

The Managers of Tynemouth, Middlesbrough, and Darlington Gas-Works are much pleased with it, and would not be without it.

Apply to the Sole Makers:
THE WHESSOE FOUNDRY COMPANY, LIMITED,
DARLINGTON.

UNEQUALLED.

Gas Companies are solicited to try Samples of the

MIRFIELD

BLACK BED GAS COAL.

Prices and Analysis on application.

MIRFIELD (GAS-COAL) COLLIERY COMPY.
RAVENSTHORPE, NEAR DEWSBURY.

BOLDON GAS COALS.

Yield of Gas per Ton.	10,500	Cubic Feet.
Illuminating Power	16·9	Candles.
Coke	66·7	Coke.
Sulphur	0·86	Sulphur.
Ash	2·04	Ash.

As per Analysis by
Mr. JOHN PATTINSON, F.I.C., F.C.S.

For Prices, &c., apply to
W. H. PARKINSON,
THE HARTON COAL CO., LTD.,
NEWCASTLE-ON-TYNE.

Telegraphic Address: "PARKINSON, NEWCASTLE."

Awarded HIGHEST MEDAL and DIPLOMA at the Newcastle-on-Tyne Royal Mining and Industrial Exhibition, 1887, for

CANNEL & COAL.

TYNE

BOGHEAD CANNEL.

Yield of Gas per ton . . . . 13,155 cub. ft.
Illuminating Power . . . . 38·22 candles.
Coke per ton . . . . . 1,301·88 lbs.

EAST PONTOP GAS COAL.

Yield of Gas per ton . . . . 10,500 cub. ft.
Illuminating Power . . . . 17·8 candles.
Coke . . . . . 70 per cent.

SOUTH PELAW MAIN GAS COAL.

Yield of Gas per ton . . . . 10,500 cub. ft.
Illuminating Power . . . . 16·3 candles.
Coke . . . . . 73·1 per cent.

For Prices and complete Analysis, apply to

THOS. W. DANCE, SON, & HUNTER,

COAL OWNERS, NEWCASTLE-ON-TYNE:
OR
E. FOSTER & CO.,

21, JOHN STREET, ADELPHI, LONDON, W.C.

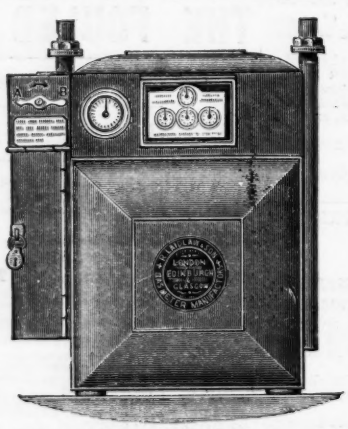
R. LAIDLAW & SON

GAS & WATER ENGINEERS.

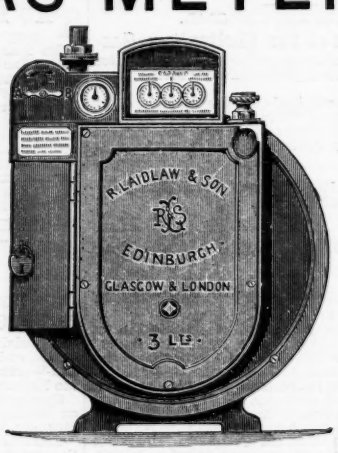
MANUFACTURERS OF WET & DRY GAS-METERS,

SIEMENS WATER-METERS,

PREPAYMENT GAS-METERS.



—DRY METER.—



—WET METER.—

EDINBURGH: SIMON SQUARE WORKS. | **GLASGOW:** ALLIANCE FOUNDRY. | **LONDON:** 6, LITTLE BUSH LANE

TROTTER, HAINES, & CORBETT, LIMITED,
Brettell's Estate
FIRE-CLAY & BRICK WORKS,
STOURBRIDGE.

Manufacturers of GAS-RETORTS, GLASSHOUSE FURNACE & BLAST-FURNACE BRICKS, LUMPS, TILES, and every description of FIRE-BRICKS.
Special Lumps, Tiles, and Bricks for Regenerative and Furnace Work.
SHIPMENTS PROMPTLY AND CAREFULLY EXECUTED.

LONDON OFFICE: R. CULL, 34, OLD BROAD STREET, E.C.

THOMAS TURTON AND SONS, LIMITED,
SHEAF WORKS, SHEFFIELD,
MANUFACTURERS OF
FILES OF BEST QUALITY FOR ENGINEERS.
STEEL OF ALL DESCRIPTIONS.
SCREW STOCKS, TAPS AND DIES, SPANNERS, RATCHET BRACES, LIFTING JACKS, ANVILS, VICES, AND ENGINEERS' TOOLS GENERALLY.
LONDON OFFICE:
90, CANNON STREET, E.C.

NITRATE of Thorium and Cerium.
FABRIK CHEMISCHER PRAEPARATE VOR STHAMER, NOACK, AND CO., HAMBURG.

EVESON FOR COAL

ANOTHER REMINDER!

TELEGRAMS: "EVESON, BIRMINGHAM."

THOMAS DUXBURY & CO.,
16, DEANSGATE, MANCHESTER.
Best Gas Coal and Cannel, giving High Illuminating Power, Large Yield per ton, and reasonable in Price.
Telegrams: "DARWINIAN, MANCHESTER."
Telephone 1806.

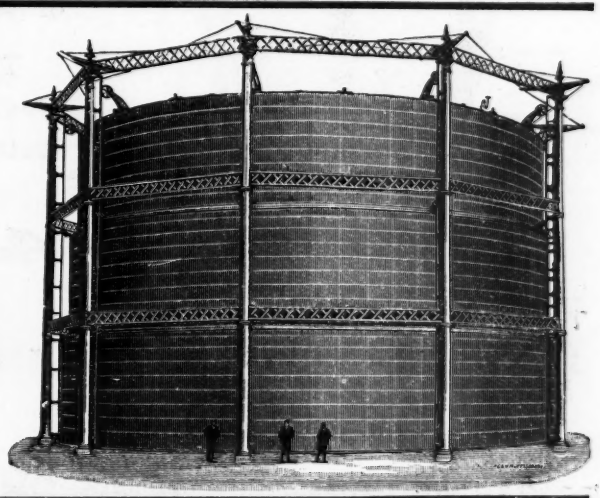
CRESSWELLS' ASBESTOS CO., LTD.
WELLINGTON MILLS
BRADFORD, YORKS.
Asbestos Spinners and Manufacturers.
Telephone No. 950. Tels.: "ASBESTOS, BRADFORD."

If you want a **FRICTIONLESS PACKING**, order the Original **"CRESSWELL'S."**

It is cheaper in First Cost, and better than Imitations. Ask for No. 1 Catalogue.
Applications for Colonial and Foreign Agencies desired.

HARDMAN & HOLDEN, LD.
ESTABLISHED 1820.
SULPHURIC ACID.
GUARANTEED absolutely free from Arsenic and of excellent Purity. Specially prepared for Sulphate of Ammonia Manufacturers.
Works: BLACKBURN; Miles Platting and Clayton, MANCHESTER.
Head Office: Miles Platting, MANCHESTER.
Inquiries Solicited.

HANNA, DONALD, & WILSON,
(Established 1851),
GAS ENGINEERS & CONTRACTORS,
ABERCORN FOUNDRY AND ABBEY WORKS,
PAISLEY, N.B.,
MAKERS OF
Gasholders & Gas Plant
OF EVERY DESCRIPTION.
Telegraphic Address: "Donald, Paisley."



JONAS DRAKE & SON,
OVENDEN, HALIFAX,
HAVE ERECTED **500** OF THEIR PATENT
TUBE REGENERATOR
FURNACES DURING THE LAST **4** YEARS.
ESTIMATES ON APPLICATION.
Telephone No. 43. HALIFAX EXCHANGE. | LONDON OFFICE: **34, VICTORIA ST., S.W.** | Telegraphic Address: "DRAKESON HALIFAX."

SCOTT-SNELL
SELF-INTENSIFYING LAMP.

Automatic Action.

No Complex Mechanism.

"Power" Free of Cost.

TYPE OF SCOTT-SNELL LAMPS
NOW IN USE
AT THE GLASGOW EXHIBITION.

INTENSIFIED LIGHT

WITHOUT Compressing Plant, Special Gas-Service, Water Bill, Gas-Engine or other Pumping Appliances, tearing up of Roadways, or interference with existing Service.

The **SCOTT-SNELL LAMP** may be set to give any pressure from **4 inches to 36 inches** of **Water; 8 inches to 10 inches is usually preferred.**

400-CANDLE POWER OBTAINED FROM A SINGLE BURNER.

Lanterns supplied with Single, Duplex, or Cluster of Burners.

TO GAS ENGINEERS AND MANAGERS.

At the Stand on the North Bank of the Kelvin, an attendant will be pleased to give full explanation, and to show the action of the Lamp,

This unique Illustration of Wasted Bye-Products (heat in escaping products of combustion) effecting, without cost, all that is elsewhere reached by special motive power and special distributing Mains, should not be missed.

HIGH-PRESSURE LIGHTING HAS COME TO STAY.

Orders for Trial Lamps will, as far as possible, be executed in rotation.

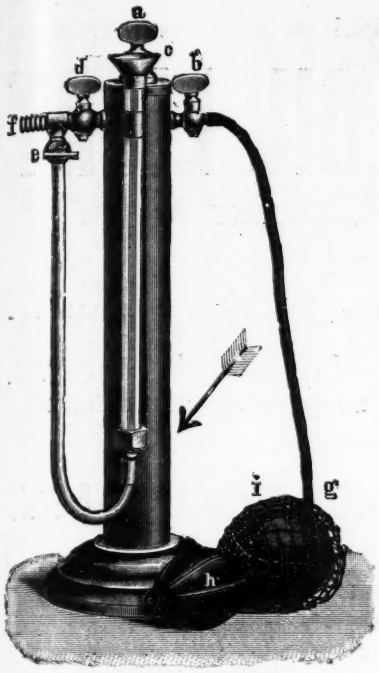
The Lamps are being made by Automatic Machinery, similar parts interchangeable, minimum of hand labour.

THE LAMPS MAY BE INSPECTED AT ANY TIME BY APPOINTMENT.

THE SCOTT-SNELL SELF-INTENSIFYING GAS-LAMP COMPANY, LTD.,

Telephone No. 559 Westminster.
Works: 29, GILLINGHAM STREET, S.W.

53, Victoria Street,
WESTMINSTER, S.W.



No. G 44,119.

THE "WIZARD" GAS LEAK DETECTOR.

(PROTECTED BY ROYAL LETTERS PATENT).

INDISPENSABLE

TO

GAS-FITTERS, PLUMBERS, FITTINGS MAKERS, AND ACETYLENE ENGINEERS.

NOT ONLY

DETECTS BUT LOCATES.

PARTICULARS ON APPLICATION.

FALK, STADELMANN, & CO., LIMITED.

VERITAS LAMP WORKS,

83, 85, & 87, FARRINGDON ROAD, LONDON, E.C.

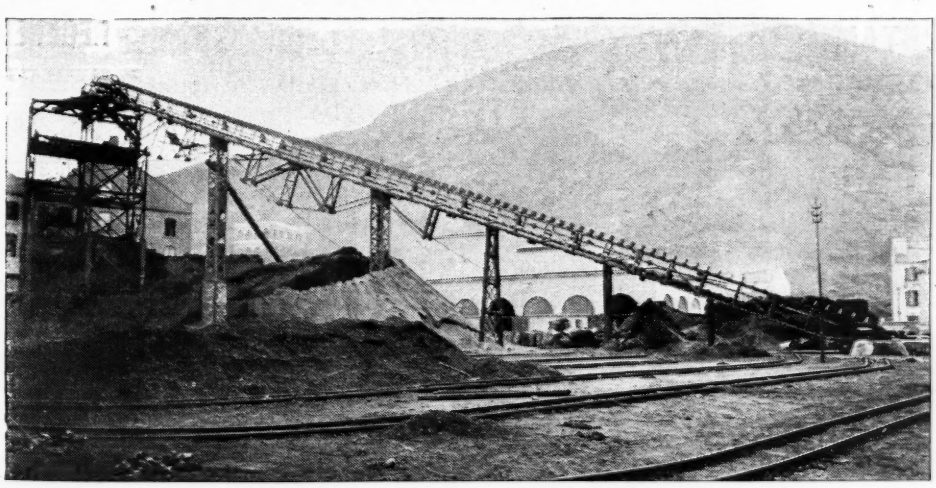
ELEVATORS AND CONVEYORS

We have for many years made a speciality of Coal and Coke Handling Machinery, and have recently, at great Cost, installed New Plant for more rapid and economic production.

ORDERS ON HAND include the complete equipment of several of the largest Retort-Houses in the United Kingdom, with our Automatic Coal and Coke Breaking, Elevating, and Conveying Appliances.

Telegrams: "FILTER, GREENOCK."

Branch Office: 110, CANNON ST. LONDON.

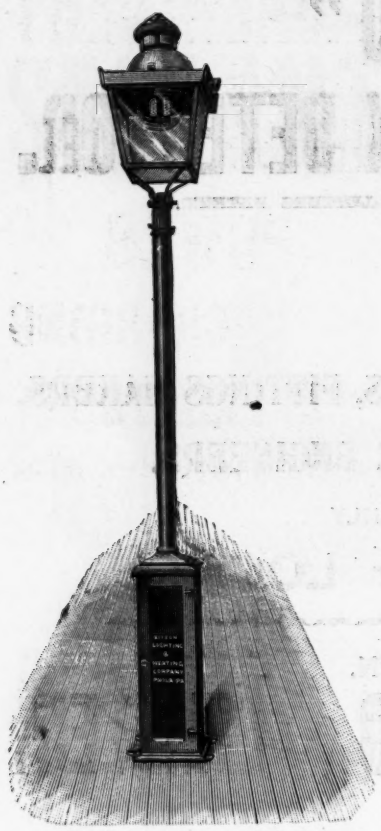


Codes: A.1. A.B.C.

Head Office: GREENOCK.

Inclined Coal Conveyor—Capacity 200 tons per hour.

BLAKE, BARCLAY, & CO., VICTORIA WORKS, GREENOCK.



THE

"KITSON" OIL LIGHT

(VAPORIZED PETROLEUM BURNT WITHIN A MANTLE.)

1200-Candle Power, 1d. per Hour!!!

For Streets, Stations, Yards, Factories, &c., &c.

A System of Lighting surpassing all others in respect of

EFFICIENCY AND ECONOMY.

Self-contained Lamp-Posts.

No tearing up of the Thoroughfares.

See Professor Lewes and Dr. Boverton Redwood's Joint Report.

("JOURNAL," *Feb.* 5, *p.* 338.)

KITSON LIGHTING AND HEATING SYNDICATE, LIMITED,

BLACKFRIARS, LONDON, E.C.

The LEEDS FIRECLAY CO., LD.,

Telegrams: "SETTINGS, LEEDS." Telephone: No. 1332.

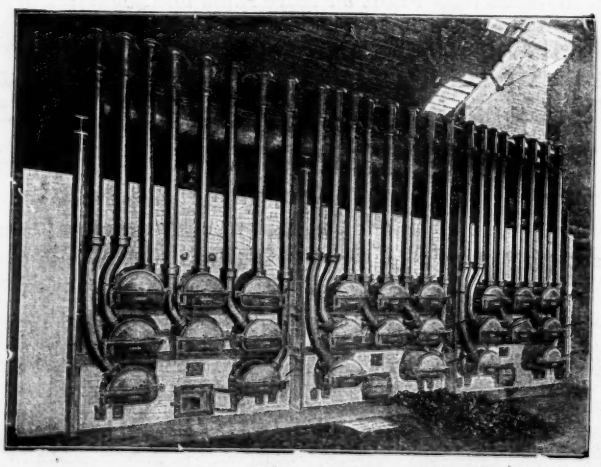
WORTLEY, LEEDS.

ENGINEERING DEPARTMENT

RETORT

INCLINED,
HORIZONTAL,
REGENERATOR,
GENERATOR,
AND
DIRECT FIRED.

RETORTS RE-SET.



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SHALLOW REGENERATORS A SPECIALITY.

NUMEROUS TESTIMONIALS.

GUARANTEED RESULTS EXCEEDED IN MOST INSTANCES.

SOLE MAKERS OF HUDSON & RANN'S PATENT AUTOMATIC CHIMNEY DRAUGHT REGULATOR.

MOUTHPIECES, WITH SELF-SEALING OR LUTED LIDS.

BENCH, FURNACE, AND FLOOR IRONWORK ROOFS.

CONDENSERS, WASHERS, SCRUBBERS.
PURIFIERS, GASHOLDERS, &c.

COAL & COKE BREAKING, ELEVATING, & CONVEYING MACHINERY.

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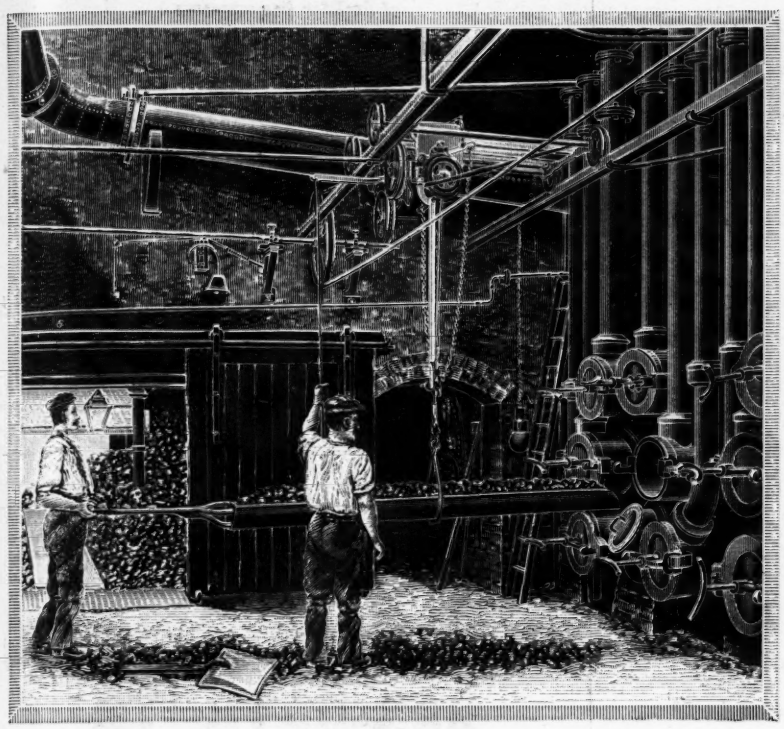

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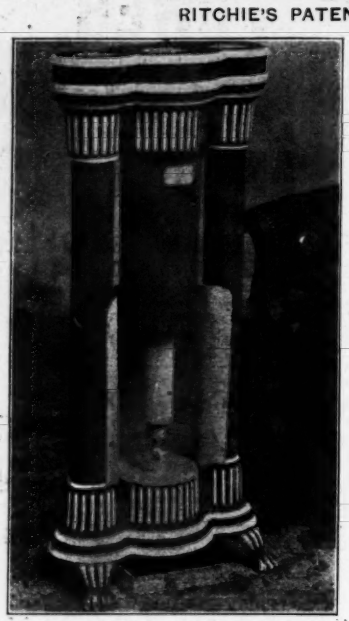

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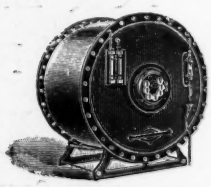

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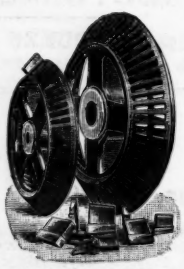

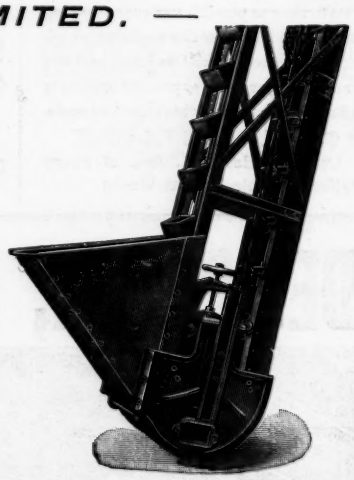

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